

11324 U.S. PTO
07/21/04

UTILITY PATENT APPLICATION TRANSMITTAL <i>(Only for new nonprovisional applications under 37 CFR 1.53(b))</i>	Docket No.	S2013-700019
	First Named Inventor or Application Identifier	
	Tylor Brooks, et al.	
	Express Mail Label No.	EV308901905US
	Date of Deposit	July 21, 2004

17858 U.S. PTO
10/896287
072104

APPLICATION ELEMENTS <i>See MPEP chapter 600 concerning utility patent application contents</i>	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
1. ☒ Fee Calculation Sheet <i>(Submit an original, and a duplicate for fee processing)</i> 2. ☒ Applicant claims small entity status. See 37 CFR 1.27. 3. ☒ Specification [Total pages 49] [42]- pages description [1]- pages abstract [6]- pages claims [34] - Total claims 4. ☒ Drawing(s) (35 USC 113) [Total sheets 9] 5. ☒ Oath or Declaration [Total sheets 2] a. ☒ Newly executed (original or copy) b. ☐ Copy from prior application Serial No.: _____ i. ☐ <u>DELETION OF INVENTOR(S)</u> Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b). If box 5b is checked, the entire disclosure of the prior application from which the oath or declaration is supplied is considered a part of the disclosure of the accompanying application and is hereby incorporated by reference therein. The incorporation <u>can only</u> be relied upon when a portion has been inadvertently omitted from the submitted application parts. 6. ☒ Application Data Sheet, See 37 CFR 1.76	7. ☐ CD-ROM or CD-R, in duplicate, large table or Computer Program (Appendix) 8. ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) a. ☐ Computer Readable Form (CRF) b. ☐ Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ paper (identical to computer copy) c. ☐ Statement verifying identity of above copies ACCOMPANYING APPLICATION PARTS 9. ☒ Assignment Papers/cover sheet & documents(s) 10. ☐ 37 CFR 3.73(b) Statement <i>(when there is an assignee)</i> ☐ Power of Attorney 11. ☐ English Translation of Document <i>(if applicable)</i> 12. ☒ Information Disclosure Statement PTO-1449 ☒ Copies of IDS Citations 13. ☐ Preliminary Amendment 14. ☒ Return Receipt Postcard (MPEP 503) <i>(Should be specifically itemized)</i> 15. ☐ Certified Copy of Priority Document(s) <i>(if foreign priority is claimed)</i> 16. ☐ Request and Certification Under 35 U.S.C. §122(b)(2)(B)(ii) 17. ☐ Other: _____ _____

18. NOTE TO PRACTITIONERS: If a CONTINUING APPLICATION, supply the requisite priority or continuity information in (1) the body of the application, or in a preliminary amendment, and (2) in an Application Data Sheet under 37 CFR 1.76.

19. CORRESPONDENCE ADDRESS

Correspondence address below

Customer Number: 37462

20. SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

NAME

Matthew B. Lowrie, Reg. No. 38,228

SIGNATURE



DATE

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Docket No. S2013-700019

Inventor(s): Tyler Brooks, et al.
Serial No: Not yet assigned
Filed: Herewith
For: PROGRAMMABLE TICKETING SYSTEM

CHECK BOX, if applicable:

☐ DUPLICATE

Fee Calculation Sheet

CLAIMS	FOR	NUMBER FILED	NUMBER EXTRA	RATE	FEE
	TOTAL CLAIMS (37 CFR 1.16(c))	34 -20=	14x	\$ 18.00	= \$ 252.00
	INDEPENDENT CLAIMS (37 CFR 1.16(b))	9 - 3=	6 x	\$ 86.00	= \$ 516.00
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d)) +			\$ 290.00	= \$ 0.00
				BASIC FEE (37 CFR 1.16(a))	\$ 770.00
	Fee for Petition for Extension of Time (if any)				\$ 0.00
	Other Fees (if any)				\$ 0.00
	Total of above Calculations =				\$ 1,538.00
	Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28)				\$ 769.00
	Assignment Recordation Fee (if any)				\$ 40.00
	TOTAL =				\$ 809.00

1. A check in the amount of \$ 809.00 is enclosed.

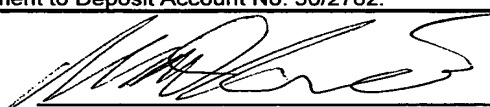
General Authorization to Charge Deposit Account

The Commissioner is hereby authorized to act in accordance with the boxes checked, below.

2. a. ☒ If the filing of any paper in this application necessitates the payment of a fee under 37 CFR §§ ☒ 1.16 or ☒ 1.17, and the fee due is in an amount different from any enclosed check or if no check is enclosed, the Commissioner is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50/2762.
- b. ☒ The applicant hereby revokes any prior authorization to charge a fee due under 37 CFR §§ ☐ 1.16 ☐ 1.17 or ☒ 1.18.

General Request for Extension of Time

3. If the filing of any paper in this application necessitates an extension of time under 37 CFR §1.136(a), the applicant hereby requests such extension of time. If the fee due in such paper is in an amount different from any check enclosed with such paper or if no check is enclosed with such paper, the Commissioner is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50/2762.


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- 1 -

PROGRAMMABLE TICKETING SYSTEM

BACKGROUND OF INVENTION

1. Field of Invention

5 The present invention is directed to systems and methods for accessing facilities and, more particularly, for automatically and dynamically controlling access to facilities and for collecting and providing visitor data.

2. Discussion of Related Art

10 Tourism is a vital industry in many locations, including for example cities in the United States. A number of systems have arisen in the context of promoting tourism to generate interest in visiting attractions, such as museums, guided tours, rides, parks, etc.

 In this context, others have provided systems where tourists may purchase a pass that can be used at a variety of attractions. One example is a pass that is good for access
15 to more than one ski area. Another is a day pass that allows access to various attractions.

 Smart card technology has become fashionable in a variety of contexts. A "smart card" is a card that is capable of storing data on it. Such data may be changed dynamically, such as a current financial balance for the card; the card may also include pre-programmed data that is not changeable by the user, such as a unique identifier for
20 the card; other data. One example of a "smart card" is a plastic card the size of a credit card that has an embedded microprocessor for storing information, used for banking, medical alerts, etc. Such devices may be used by inserting the card into a reading device which includes a processor (or the equivalent) that may change the data on the card.

 One use of a smart card for tourist attractions is to pre-program the card with the
25 attractions that it is good for, and placing a reader at each facility. When a purchaser buys and uses the card (e.g., by "dunking" it in a reader), the reader can verify that the card has been programmed to allow access to this attraction.

 In another example, a buyer may provide an identification card, such as a smart card with a unique ID, at the time of purchase of a ticket, pass, reservation, or the like,
30 which identification may be electronically transmitted to a facility site (e.g., the attraction for which the ticket or pass was purchased). The buyer ID may be confirmed at the facility site, e.g., by presenting the smart card to a smart card reader, resulting in,

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for example, printing of a ticket, admission document etc. to allow the buyer access to the facility site. Some examples of such as system are described in U.S. Patent No. 6,738,750 to Stone et. al, issued May 18, 2004.

5

SUMMARY OF INVENTION

According to one embodiment, there is provided a terminal for use in accessing a facility, the terminal comprising a smart card data mechanism to read and write information on a dunked smart card, a verification mechanism to receive an identifier on the dunked smart card and to determine whether the dunked smart card is authorized to
10 access the facility, and a network access mechanism to connect to a remote system management computer to upload to the remote system management computer data corresponding to use of the facility by authorized smart card holders during a time period. The facility may be, for example, a paid attraction or may be a special-offer or discount.

15 According to another embodiment, a smart card for use in a geographical product may comprise a body portion and a memory in or attached to the body portion, the memory including a first data structure to store a card identifier, and a second data structure to store a product identifier, the product identifier corresponding to a set of promotions available in the geographical product. In one example, the memory may also
20 store an activation stamp that may be used to determine whether the card is valid or expired. In another example, the memory may also include one or more counters that may be linked to promotions to indicate whether promotions have been used by the card or are available for access by the card.

One embodiment may include a product manager system to manage a system that
25 permits access to rewards corresponding to a plurality of promotions, the plurality of promotions being included in at least one product, the system comprising a network interface to permit data access to reward terminals located in proximity to the plurality of promotions, a database to store at least one product definition, and a database to store data corresponding to actual use of the rewards. In one example, the product definition
30 includes a list of the plurality of promotions.

Further aspects and embodiments include a method of computing compensation for an attraction based on actual use of smart cards at the attraction, the method

comprising acts of recording a number of smart cards used at the attraction during a predetermined time period, recording a type of each smart card used at the attraction during the predetermined time period, recording data associated with each smart card; and determining the compensation based on the number, the type and the data. The type
5 may indicate whether the card is an adult card or a child card. The data may include any of a time of use of the card, an origin of the purchaser of the card, an indication of other attractions accessed using the card, etc.

According to another embodiment, there may be implemented a method of activating a smart card for use in a multi-attraction access system comprising a plurality
10 of promotions that can be accessed, the method comprising steps of providing a smart card, storing identification information on the smart card, providing the smart card with the stored identification information to an end-user, on a first use of the smart card to access one of the plurality of promotions, storing information on the smart card corresponding to the first use. In one example, the step of storing information may
15 include storing a time stamp corresponding to a time of activation of the smart card. In another example, the method may further include a step of checking whether the card has expired by, for example, comparing a current time with the time stamp and indicating that the card has expired if the current time exceeds the time stamp plus a predetermined time interval.

Another embodiment may include an access system for use with user codes comprising a controller configured to be coupled to at least one reward terminal and configured to provide information to the reward terminal and receive data from the reward terminal once every predetermined time period, and a database, coupled to the controller, that stores the information to be provided to the reward terminal and the data
25 received from the reward terminal, wherein the information includes a promotion list of promotions accessible from the reward terminal and a product list of promotions that are accessible with each user code, and wherein the data includes a list of user codes and promotions that have been processed by the reward terminal during the predetermined time period.

According to another embodiment, there may be provided a computer readable medium encoded with a plurality of instructions to be executed on at least one processor, the plurality of instructions implementing a method of controlling access to a plurality of

attractions, the method comprising reading a card with a reader located at one of the plurality of attractions, recording a unique identification number of the card, comparing the unique identification number of the card with a product list of promotions that are accessible at the one of the plurality of attractions, and determining whether the card is
5 valid for at least one of the promotions that are accessible at the one of the plurality of attractions. For valid cards, the method may further comprise steps of displaying a reward for the at least one promotion, and incrementing a promotion counter on the card to indicate that the reward has been given.

According to yet another embodiment, there may be implemented a method of
10 creating a destination within a geographic location, the method comprising analyzing a plurality of attractions existing within the geographic location, rating each selected one of the plurality of attractions with a popularity index, building a matrix of the selected ones of the plurality of attractions, the matrix containing information about the plurality of attractions, the information including pricing information, location information and
15 the popularity index, based on the matrix, selecting a plurality of partner paid attractions from the plurality of attractions, based on the matrix, selecting a plurality of special-offer partners from the plurality of attractions, and defining the destination as a collection of the selected partner paid attractions and special-offer partners.

According to other aspects and embodiments, a method of controlling access to a
20 plurality of attractions may comprise acts of reading a card with a reader located at one of the plurality of attractions, recording a unique identification number of the card, comparing the unique identification number of the card with a product list of promotions that are accessible at the one of the plurality of attractions, and determining whether the card is valid for at least one of the promotions that are accessible at the one of the
25 plurality of attractions. For valid cards, the method may further comprise steps of displaying a reward for the at least one promotion, and incrementing a promotion counter on the card to indicate that the reward has been given.

30

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings, are not intended to be drawn to scale. In the drawings, each identical or nearly identical component that is illustrated in various figures is represented by a like numeral. For purposes of clarity, not every component may be labeled in every drawing. In the drawings:

FIG. 1 is a flow diagram illustrating one embodiment of a method of creating a destination in which an access system is to be implemented;

FIG. 2 is a schematic diagram of one embodiment of an access system according to aspects of the invention;

FIG. 3 is a flow diagram of one example of a life-cycle of a smart card used with the system;

FIG. 4 is a flow diagram of one example of an enabling procedure used to enable cards to be used with the system;

FIG. 5 is a flow diagram of one example of an order life-cycle according to aspects of methods of the invention;

FIG. 6 is one example of a flow diagram showing activation of a card by a reward terminal 120;

FIG. 7 is a flow diagram of one example of a procedure that may be implemented by a reward terminal when a card-visitor attempts to use a card to access a promotion;

FIG. 8 is a conceptual diagram of information that may be stored in a memory structure of a smart card that may be used with the system;

FIG. 9 is a flow diagram of one example of a procedure for sending records to the gateway;

FIG. 10 is a flow diagram of one example of a procedure for uploading information from the gateway to the database; and

FIG. 11 is a representation of one example of a graphical user interface that may be provided to system manager users.

DETAILED DESCRIPTION

Various embodiments and aspects thereof will now be described in detail with reference to the accompanying figures. It is to be appreciated that this invention is not limited in its application to the details of construction and the arrangement of

components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of “including,”

5 “comprising,” or “having,” “containing,” “involving,” and variations thereof, herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items.

The embodiments below will be described in the context of providing an access facility for tourist attractions at a tourist destination, e.g., a system that allows
10 coordinated access to a group of attractions in one geographical area. Certain aspects of the systems and methods described below have broader application and may, for example, be applied in the context of controlling or coordinating access to other types of facility, features, attractions, or resources. The context of the embodiments described below is not intended as limiting all aspects of the present inventions, except where the
15 language of the claims expressly limits them in this manner.

A wide variety of tourist destinations such as, for example, cities like London, Boston, Chicago, New York and many others, offer an array of attractions such as museums, restaurants, historic buildings, galleries, shops and markets that are of interest to tourists. Conventionally, access to all the attractions at any one of such destinations is
20 individually controlled and managed by the various attractions themselves. For example, a tourist wishing to visit a museum, a gallery and a restaurant, would travel to each of these attractions, queue and pay separately for access to each attraction using cash, credit card, travelers’ checks, etc.

According to various embodiments and aspects of the present invention, there is
25 provided a system and business model for allowing tourists access to a variety of attractions using a passcard that may be, for example, pre-paid. The system and methods described herein may offer value and convenience to tourists including special discounts and easy access to many attractions using the card, and in some examples can remove the need to queue and pay for each attraction separately. Certain embodiments of the
30 systems and methods may also provide benefits for attraction managers and owners including encouraging visitors, greater visibility and simplified payments and certain

embodiments may also allow greater flexibility and mechanisms for determining compensation of the attractions.

According to one embodiment, a system comprises a plurality of terminals that are located at various attractions and a plurality of cards that are used to access the attractions via the terminals. Visitors may obtain a card, for example, a smart card including embedded technology, that may allow them to access some or all of the attractions. Exemplary terminals and cards, and their operation, are described in more detail below.

Each terminal is coupled to a central controller that manages the system and collects data from the terminals. In this context, “coupled” includes any vehicle for communicating data, including for example a direct connection, a periodic networked connection. In one embodiment that is advantageous in a variety of contexts, the terminals may be coupled to the central controller once per night for batch-processing of the exchange of data.

Data communicated to the central controller may include data representing how many cards have been used to access the attraction at which each terminal located and may further include data about such accessing, e.g., the time(s) that cards were used to access the attraction or even identifying information about the specific cards used to access the attraction.

The central controller may be used to calculate compensation for each attraction based on level of use, e.g., the compensation for allowing the bearer of each card access to the attraction. The controller and its operation are described in more detail below. Thus, embodiments of the system operate to allow owners of cards access to multiple attractions without having to pay separately for each attraction. Rather, a person may simply pay once for a card and use that card to access attractions that are partners of the system.

Attractions may be paid by the system manager at the end of a day, week, month or other time frame, access fees corresponding to all the cards that have been used at that attraction during the time period, rather than being paid as a percentage of gross revenue for the cards (although in other embodiments, this latter method may be used).

Once a geographic location in which the system is to be implemented has been selected, a destination may be “created” by developing contractual relationships between

the system manager and various paid attractions near or in the destination. It is to be understood that the term “destination,” as used in this example, refers to a geographical area in which the access system according to various embodiments of the invention is implemented. A destination may be, for example, a city like Boston or New York, a resort or collection of resorts, a theme park or collection of theme parks, or any other
5 geographic area that contains a viable number of attractions, as is discussed in more detail below.

The system manager refers to a company or entity (or group of entities) that endeavors to deploy the system at the destination. In doing so, contractual relationships
10 may be formed between the system manager and each partner attraction. Where this is done, a variety of different types of contractual relationships may be formed. In one example, the system manager may contract with each attraction and compensate the attraction based on actual use by tourists. Where this is done, the system manager may seek a discounted rate from the attraction based on expected increased numbers of
15 tourists visiting the attraction, or even a compensation rate that based on the actual number of tourists visiting the attraction or a charge per tourist based on time of day (e.g., less for off-peak hours or at the end of the day) or some other data such as country of origin of the tourist (e.g., less or more for visitors from far away). For example, the system manager may pay a partner attraction a first rate for the first fifty card-visitors per
20 day and a discounted second rate for any additional card-visitors that day.

Factors that may be used in a formula that can be used to calculate compensation of an attraction may be simple (e.g., number of uses) or a little more complicated (e.g., a discount of the total admission price that would have been paid by users). Other factors include: time of day of use, day of the week, month (e.g., peak vs. off-peak season), etc.
25 Other factors may be based on information about the visitor. For example, an attraction may find it desirable to receive a regular admission price for card-visitors it has strong reason to believe would come anyway, and charge a discounted rate for visitors it thinks it could not otherwise attract. Data about visitors that may be used to calculate compensation may include: geographical origin of the visitor, the difference in time
30 between purchase of the card and its first use (e.g., distinguishing people who buy on impulse from people who plan well in advance), age group to which the visitor belongs, whether the visitor has also accessed related attractions (e.g., a visitor who accesses both

a museum's special exhibit and its Imax theatre may receive a discount for one or both attractions). etc. For example, a children's' museum may give the system manager a very low rate for adults who visit the museum in order to encourage adults to bring children to the museum who could not come on their own.

5 According to one embodiment, compensation to partner attractions may be time sensitive. For example, the system manager may compensate the partner attraction differently for card-visitors that visit the attraction at different times of day or year. In one example, a partner attraction may receive \$10.00 for any card-visitors that access the attraction before 5pm and only \$5 (or nothing) for any card-visitors that access the
10 attraction after 5pm. In another example, an attraction may receive one rate of compensation for card-visitors that access the attraction during a peak season and a lower rate of compensation for card-visitors that access the attraction during an off season.

 In one example, an attraction may charge the system manager a discounted rate for card-visitors and also require the attraction to accept acknowledgement of admission
15 for card-visitors by installing and utilizing the smart card terminal provided to them by the system manager. The term "card-visitor" as used herein refers to a visitor to an attraction (e.g., a tourist to the destination) who has purchased a card (e.g., purchased directly or indirectly from the system manager) and is using the card to access the attraction.

20 Referring to FIG. 1, there is illustrated a flow diagram of one embodiment of a method for selecting a destination and configuring products for that destination. As discussed above, in a first step 100, the system manager may select a potential destination based on criteria such as the number and locations of attractions within the destination, the frequency of tourists to the destination, ease of traveling between
25 attractions, etc. According to one embodiment, a destination may be selected based on a number of factors, including an estimated number of visitors, their typical visitation profile (e.g., do they come for a week or for a weekend), and the number of attractions that charge admission within the geographical area of the destination. These factors may be used to determine whether there will be enough visitors to the destination to make it
30 commercially viable for the system manager and whether there will be value created for these visitors by the system, in other words, whether there are sufficient attractions

within the destination that will agree to contract with the system manager to offer discounted rates and other special offers to card-visitors.

Partner attractions (e.g., paid-admission attractions that agree to contract with the system manager) may be selected based on a number of criteria. For example, it may be desirable that the partner attractions be of a certain quality so that card-visitors have a good experience at the partner attractions and the partner attractions reflect well on the system manager.

Partner attractions may be willing to provide the system manager with a proper discount to meet the needs of the system manager, particularly in systems that compensate partner attractions on a per-use basis. For example, an offered discount may allow a price for the card that encourages visitors to buy cards from the system manager but also makes partnering with the attraction commercially attractive to the system manager.

Another factor may be the usual price of admission to the attraction. For example, the partner attractions may typically not be too highly priced (relative to other attractions) because that may either drive up the price of the card such that customers do not want to buy them or may adversely affect the profits of the system manager. Other factors that may be taken into consideration are the popularity of the attraction, the estimated "dwell" time of visitors (i.e., how long does the average visitor stay at the attraction), and the distance to other attractions.

While not limiting with respect to all embodiments of the present invention, compensating partner attractions on a per use basis may permit the system to be put in place more easily. Partner attractions do not have the uncertainty of an unknown return on their participation in the system and, as described above, discounts can be determined based on volume, timing, or other data concerning the actual use of the attraction by card-holders. As discussed above, discounts may be time sensitive, may depend on the type of person (e.g., a adult versus a child), or other may be based on a combination of factors that may include characteristics of the attraction itself and/or the card-visitors. In another example, the system manager may subsidize discounts for various promotions. For example, a card-visitor may receive a 20% discount off the regular admission to a certain attraction, 15% of which may be covered by the attraction and 5% of which may be subsidized by the system manager.

In a next step 102, the system manager may identify potential partner attractions for the system to be implemented in the destination.

In selecting a destination, the system manager may consider not only potential partner attractions, but also “special-offer partners,” namely shops, restaurants and other services that do not require paid admission, as illustrated by step 104. The system manager may contract with such special-offer partners to offer card-visitors special offers and discounts. Inclusion of special-offer partners may make the card more attractive to customers and offer customers greater value for the card. Ideally, the system manager may include enough of the area’s popular attractions (both paid admission and other attractions) to interest potential purchasers and deliver an easily calculated value for them to choose to buy the card over buying tickets to each attraction individually.

According to one embodiment, once an initial assessment of the destination has been done by the system manager and a target selling price of the card is established, partner attractions may be selected using a “daily budget.”

In this example, the daily budget is a measure of the amount expected to be paid by the system manager to the various partner attractions for the total use of a card. The budget may be based on the target selling price of the card, less any sales commissions that are expected to be paid to sales partners, less an estimated material cost of the system apportioned to one card, less a desired profit for the system manager. For example, for a two-day card, the budget calculation may be as shown below:

Target Selling Price	:	+ \$69.00
Average Commission	:	- \$14.00
Material Costs	:	- \$4.00
Desired Profit	:	- \$10.00
Daily Budget	:	= \$21.00 (per day)

In other words, for a two-day card sold for \$69.00, the total cost (i.e., amount paid by the system manager to the partner attractions) for all the paid attractions visited by a card-visitor over the two days should be \$42.00 (or \$21.00 per day) and deals with partner attractions may be struck accordingly.

On the other hand, the above daily budget may be used to set the target selling price for the card. In this example, the system manager may determine that the average

compensation to attractions is \$21 per day and, therefore, the target selling price needs to be set at \$69 in order to achieve a desired profit of \$10.

Of course, it is to be appreciated that the above example is for the purpose of illustration only and is not intended to be limiting. The cards may be sold for any price
5 determined to be appropriate by the system manager, and the costs and desired profits may also vary, resulting in a budget different than the given example. The numbers used to calculate the budget may all be based on an estimated most popular duration (i.e., based on an analysis of how long visitors typically spend in a destination city).

Referring again to FIG. 1 and this particular example, the system manager may
10 calculate an average commission and average material costs in step 106. The average commission may for example take into account wages etc. paid by the system manager to its own or affiliated sales people or agents. According to one example, the average commission may be calculated based on an estimated number of sales people and cards sold over a given time period, to apportion an appropriate sales cost to each card.
15 Similarly, the material costs may include a representation of the costs of manufacturing the cards and possibly also manufacturing, installing and maintaining the terminals and other equipment.

In step 108, the system manager may determine a target selling price for cards at the destination. The target selling price of a card may be determined based on many
20 factors such as, for example, a price that will be appealing to the market, the amount of value that an average user will receive, and an anticipated redemption rate, i.e., a net amount that must be paid by the system manager to the partner attractions. In one embodiment of a business model, the value that an average card-visitor may receive from using the card may be noticeably lower than what it would cost that card-visitor to pay
25 for each attraction separately, considering also that the card may provide special offers, such as discounts at shops and restaurants, in addition to admission to select paid attractions. The anticipated redemption rate may also be low enough to ensure a proper gross profit margin for the system manager. Considering all the above factors (and possibly other factors as well), pricing of the cards may be determined by balancing the
30 interests of giving value to customers and acquiring desired profits so as to select appropriate partner attractions that make the model viable.

It is to be appreciated that the system and methods may allow for a several types of cards, for example, single-day cards, multi-day cards, adult cards, child cards, senior cards, multi-person cards, etc. Target selling prices may be calculated for each type of card to be available for use in the destination and the cards programmed (as described
5 below) accordingly.

It is to be appreciated that the steps illustrated in FIG. 1 do not necessarily need to be performed in the illustrated and/or described order. The given flow diagram is merely one example of how a system manager may create a destination and is not intended to be limiting. System managers may perform these and other steps to create a
10 destination in any order that they see fit.

Once the costs, desired profits and target selling prices have all been estimated or determined, the system manager may have a target daily budget for the cards, as illustrated by step 110. The budget may be one factor used to create commercially viable destinations for the system.

15 According to one aspect of the system, the budget may be used to develop “products” within a selected destination, in step 112 of FIG. 1 (although products may be developed in other ways as well, as would be appreciated by one of ordinary skill in the art based on the disclosure provided herein).

The term “product” as used herein refers to a collection of facilities, resources, attractions, or whatever is being allocated according to the system. In the context of the
20 present example (and not intended to be limiting), “product” refers to a collection of promotions at a destination.

The term “promotion” as used herein refers to an offering by a partner attraction (for example, admission to a gallery or museum, a tour, admission to a movie or Imax
25 production, etc.) or by a special-offer partner (e.g., a 20% discount for a restaurant, 10% off at a store, etc.).

There need not be any practical limit to the number of different promotions that may be included in any particular product. The system manager may try to anticipate which attractions will be visited the most and what is near them in both paid admissions
30 (partner attractions) and special-offer partners in order to develop products that may be offered to card customers. Each card, when purchased by a customer, may be encoded with a selected product, as is described in more detail below.

Once the daily budget has been determined, the system manager may analyze the layout of the destination, taking into account all of the attractions, their proximity to one another, their popularity, the “dwell time” of visitors at each attraction, and also how much one person can do in one day. The system manager may use this information to construct initial configurations of products to be offered for a destination. Initial product configurations may be constructed based on, for example, the system manager’s knowledge of the market (which may be gathered from analyzing data about visitors to the destination) and the available attractions.

According to one embodiment, initial product configuration may be determined using an information matrix. The destination may be divided into one or more geographic sub-areas and a separate information matrix may be created for each sub-area. The size and location of sub-areas may be defined based on a number of factors such as, for example, the geographic size of the overall destination area, ease with which visitors may travel around within the destination (e.g., does the destination have efficient public transport or do visitors need to walk or drive between attractions), traffic conditions within the destination, geographic topography of the destination, the number of attractions within the destination, and the like. Each information matrix may include data relating to potential partner attractions and potential special-offer partners.

According to one embodiment, each geographic sub-area should not have the opportunity to have too much in redemption payouts to partner attractions. In other words, each geographic sub-area may have sufficient partner attractions to be enticing to visitors, but not so many as to potentially require the system manager to have to pay more than the daily budget in fees to the partner attractions. This may be achieved by making sure that there are not too many partner attractions located too close to one another, and also that each geographic sub-area has enough special-offer partners to occupy visitors while not costing the system manager any money (in those embodiments where special-offer partners do not receive compensation; in other embodiments, special-offer partners may even be required to compensate the system manager based on use of the card).

One example of an information matrix for a geographic sub-area is shown below in Table 1. Each attraction may be assigned a subjective popularity rating based on any available data. In one example, estimated costs and an estimated number of partner

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attractions likely to be visited by card-visitors may be based on an 8-hour day to allow the system manager to attempt to manage costs per day and per hour using the information matrix.

TABLE 1.

Attraction	Retail Value (\$)	Card Price (\$)	Dwell Time	Distance from Other Attractions	Popularity
Museum	12	8	90 min.	1 min.	20%
Historic Building	5	4	25 min.	15 min.	40%
Art Gallery	15	10	75 min.	10 min.	25%
City Tour	25	16	125 min.	1 min.	70%

5

In this example, once a daily budget is determined and potential partner attractions selected, the system manager may negotiate net rates with each of the partner attractions such that, when tested against maximum redemption (how much a person can physically do in a day), the total amount expected to be paid (per day) by the system manager to the partner attractions will not exceed the daily budget.

10

As should be appreciated from this specification, data gathering is possible in a way that allows assumptions to be tested or refined and the price of the card adjusted, or the various levels of compensation to attractions adjusted, as experience with the system is accrued.

15

According to one embodiment (e.g., one where attractions are compensated based on actual use), the system manager may collect data representative of all uses of all cards in the destination and analyze the data to determine the amount owed to each partner attraction by the system manager.

In one example, the system manager may pay each partner attraction monthly for all the card uses at that attraction. Of course, it is to be appreciated that the system is not limited to monthly payments. The system manager may negotiate and contract with each partner attraction to pay that partner attraction over any predetermined time period, for example, daily, weekly, bi-weekly, or any other mutually acceptable time period. In this example, the system offers the benefit to partner attractions of simplified payment, namely, that they may be paid once in a time period, for example, once a month, for all card-visitors to the attraction, rather than accepting multiple individual payments for

20

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each visitor at the time of each visit. Various examples of payment systems and data collection are described in more detail below.

Once a destination has been created by developing contractual relationships with various partner attractions (paid attractions) and special-offer partners, the destination
5 may be considered ready for launch. A destination that is ready for launch may have enough value created in total admission prices and key attractions signed (confirmed partner attractions) to be reasonably expected to attract customers.

According to one embodiment, the system manager may develop and produce a guidebook or brochure that may include descriptions of all partner attractions and special
10 offer partners in the destination (step 114). The guidebook may be provided or sold to customers who purchase cards to assist the customers in planning and visiting desired attractions. The fact that a system manager may provide a guidebook may be an additional incentive for special-offer partners to join the system because the book may be a form of advertising for the special-offer partner and increase the visibility of the
15 special-offer partner.

In addition, the system manager may install terminals at each of the partner attractions and configure a network of smart card readers (step 116), as is discussed in more detail below. When the book, smart cards and terminals are all complete, the destination may be launched, i.e., the system may become active in the destination.

20 Once a destination is launched, the system manager may collect data about card usage in the destination, as is discussed in more detail below. According to one embodiment, the system manager may analyze the data and compare it to the list of partner attractions and special-offer partners and add or subtract attractions or negotiate better pricing to maximize profit. The system manager may also use the collected data to
25 reconfigure products (as illustrated by line 118) offered in the destination to improve, for example, the value added by the card and the profits achieved by the system manager.

Referring to FIG. 2, there is illustrated a schematic diagram of one embodiment of a system according to certain aspects of the inventions.

The system may include one or more reward terminals 120 which may be
30 configured as smart card readers, as is described in more detail below. A reward terminal 120 may be located at each partner attraction and be configured to read cards

124 presented to it and to indicate whether or not a card-visitor 122 has access to the attraction.

A database 126 may be included (shown in this example as stored in a central location, run by the system manager, and updated over a network with nightly downloads to the terminals of any changes to products that use this attraction (and the cards that therefore allow access) and uploads to the database of actual use data) to store data relating to the system, cards, partners, etc., as is discussed in more detail below.

“Database” as used herein includes any data structure to store data and a “database” may be a collection of separate databases or a subset of data in a larger database; “database” includes information intended to be archival or used only for temporary storage.

Embodiments and aspects of the access system and methods described herein implement all-inclusive ticketing to destination attractions (partner attractions) and discounts etc. at special-offer partners such as shops and restaurants. According to one embodiment, there may be provided a highly secure and efficient system based on smart card technology and requiring no paper transactions.

As discussed above, partner attractions and special-offer partners offer promotions such as, for example, admission to a museum or gallery, discounts at shops and restaurants, etc., to card-visitors. Promotions may be accessed using a purchased card via, for example, a reward terminal. According to one embodiment, each promotion may have a unique promotion code that may be stored by the system, for example, in database 126 illustrated in FIG. 2. Promotions may be company-wide or venue-specific. For example, a company (either a partner attraction or a special-offer partner) that has multiple locations might have one promotion that is good at all locations and individual promotions for specific locations. For example, a restaurant chain may offer a lunch special that is good at all locations, but a dinner special that is only good at one location. Partner attractions and special-offer partners may communicate with the system manager to set up the promotions that they wish to offer. These promotions may be altered at any time by agreement between the partner attraction, or special-offer partner, and the system manager in the manner (for example) described herein.

According to one embodiment, promotions may have constraints that control when, where and/or how often a card-visitor may access the promotion. Promotions may be constrained for example in time. Some examples of possible time constraints include

time of day, day of the week and date. For example, a promotion may be constrained to be valid only from noon to 3pm on Wednesdays during the month of June. Time constraints may be agreed upon between the partner attraction (or special-offer partner) and the system manager and may also be altered whenever suitable.

5 In another example, promotions may be constrained by quantity. In other words, a card-visitor may be limited to a fixed number of uses of a promotion during the lifetime of a card. For example, a card-visitor may be allowed to take a tour at any time during the lifetime of a card, but only once. In another example, promotions may be constrained by how often they are used in a given time period. For example, periodicity may be
10 defined in terms of a calendar. This means that a promotion may be constrained to a certain number of uses in a single day or number of days. For example, a museum may offer free admission to a card-visitor every day, but only once a day. In another example, the card may be used more than once per day, but not twice within an hour. This may be done, for example, to help assure that only one person is using a card.

15 Any of time, quantity and frequency of use constraints may be set up by the system manager in agreement with the partner attraction or special-offer partner and may be changed at any time. In addition, promotions may be constrained in a combination of time, quantity and frequency of use. The system allows the system manager, and therefore the partner attraction or special-offer partner, to configure promotions to have
20 whatever constraints may be desirable and to modify the promotions whenever necessary.

 According to one embodiment, every promotion may have an absolute time period (which may be never ending) along with modifications that make the promotion only good on certain days of the week and/or at certain times of the day. Partner
25 attractions and special-offer partners may design their offers to meet business specific needs, for example, driving business at off hours. The system manager may program each promotion to have the tailored features and restrictions desired by the partner attractions and special-offer partners. In appropriate contexts, this flexibility can facilitate reaching an appropriate agreement on the level of discount provided to the
30 system manager.

 As discussed above, “products” includes collections of promotions. There may be no limit to the number of promotions that can be included in a product.

According to one embodiment, each product may have a unique product code and cards may be enabled with this code when they are purchased by customers. Thus, in this example, cards used in the system may be programmed with a particular product code, rather than (or in addition to) each of the promotions that make up the product.

5 Then, product identifier controls what set of promotions the user can use. A product may not have a time limit, however, system operators may typically create new products seasonally, or if attractions within a destination change.

Various embodiment of the system are designed to use smart cards to allow customers to access and use the system. Smart cards are often implemented as credit-
10 card sized plastic cards that have an embedded, programmable microchip that includes a memory or storage device. Such cards may be ordered from the manufacturer in the "factory fresh" or new state.

Referring to FIG. 3, there is illustrated a flow diagram of one example of a card "life-cycle." In the new state 130 a card may have the system manager graphic printed
15 on the front and/or the back and the card has a unique serial number programmed into the serial number field of the card. In one example, the serial number may also printed on the back or front of the card. In addition, the card may have a security code, for example, a default security code programmed at the factory, programmed into the card's memory. One example of smart cards that may be used with the system are SLE 4442
20 Secure Memory Smart Cards which can be purchased from a number of smart card manufacturers including, for example, CardLogix, GemPlus and TxSystems. It is to be appreciated however, that the system is not limited to this specific type of smart card. In addition, although a preferred embodiment of the system and methods described herein may be implemented using smart cards, the system and methods are not so limited and
25 may be implemented using unique bar-codes or pin numbers that may be supplied to customers instead of smart cards.

After new cards 130 have been obtained by the system manager, the cards may be enabled by an enabler 140 (see FIG. 2). New cards 130 become enabled cards 132 when they are programmed with a specific period, type and product. In addition, the card's
30 security code may be changed from the factory default to something only known by the system manager network. This may prevent fraudulent cards from operating in the network.

According to one embodiment, the enabler 140 may be a smart card enabled point of sale terminal, similar to the reward terminal 120. One example, of a terminal that may be used as an enabler for the system is an Allegro 100 terminal from Intellect. However, several manufacturers (e.g., Hypercom, Verifone, Lipman, and others) produce smart
5 card enabled POS terminals that may also be used.

The Enabler may be used to transform new cards 130 into enabled cards 132. An enabled card may have additional features programmed into the card compared with new cards 130. For example, an enabled card may have a card type (e.g., adult, child or senior), period (for example, a two-day card may be programmed as such) and a product
10 (represented by a product code) programmed into the card.

Referring to FIG. 4, there is illustrated a flow diagram of one example of a procedure that the enabler 140 may implement to turn new cards 130 into enabled cards 132. In a first step 142, an operator may swipe or “dunk” a new card into the enabler terminal. The enabler may interrogate the card to determine if it is a system-compatible
15 type of smart card, for example, an SLE 4442 based smart card, in step 144. If not, an error is indicated, as shown by box 146 and enabling is discontinued. If the card is a valid type, in a next step 148 the Enabler may read the state of the card. If the card is already enabled, then the terminal displays a report of the current enabled state including the card type, period, and product, in step 149. Enabling is discontinued and the enabler
20 may display an error (box 146). If the card is not valid and not yet enabled, the enabler may proceed with the enabling process.

It is to be appreciated that the terms “swipe” and “dunk” are used interchangeably in this disclosure and are intended to mean any manner in which a card may be read by a terminal including, but not limited to, swiping the card through a terminal, inserting the
25 card into the terminal, contactless reading/writing of the card by the terminal, etc.

According to one example, in a next step 150, the Enabler may override the factory default security code on the card and program the card with a new security code that is known only to the system manager network. If the card does not have the factory default security code present on the card, the enabler may display an error (step 146) and
30 enabling may be discontinued. In a next step 152, the enabler may program the card with the card type (e.g., adult, child or senior), period (e.g., one day, two day, one week) and product by writing representative codes into predefined fields of the smart card. If the

card fails to program, the operator may be told of the error (step 146) and enabling is discontinued.

Once the enabler has programmed the card, the enabler may record the card serial number, and the programmed product, period and type along with the current date and
5 time in a memory device of the enabler. This information may be transferred later to the Gateway as is discussed below in more detail. Finally, the operator may remove the card from the enabler. The card is now enabled and may be referred to as an enabled card. Enabled cards are ready to be sold to customers for use with the system. While enablement may be done at the point-of-sale, enablement may also be done in advance as
10 described below.

Referring again to FIG. 3, after cards are enabled, they may be assigned to a particular sales channel to be sold to customers, thereby becoming "assigned" (block 134). Cards become assigned when the card is promoted to the assigned state in the database 126 (see FIG. 2). The act of assigning a card to a sales venue in the database
15 promotes the card to the assigned state. At this point in the lifecycle, the card can be sold by the sales venue to the customer. Assigned cards become "sold" (block 135) when the card is sold to a customer.

According to one embodiment, the system manager may use an order system to track sales of enabled cards. A "sold" card may generate an order that is used to track
20 payment for the card. Orders may begin in a blank state, as shown by block 160 in FIG. 5. An order may be used to eventually tie a customer, the sales agent, and the card product together. Order data may then be used for a variety of purposes including determining how much sales commission is to be paid to agents, popularity of various types of products, and other uses described in more detail below. Blank orders may
25 become "described" when a sales agent, customer and card product are specified in the order, indicated by block 162. Described orders may become "voucher" (block 164) when the customer has confirmed the purchase of a card. However, in this state, a card has not been assigned to the order and payment is not yet due. Described or voucher orders may become satisfied (block 166) when a card is assigned to the order. At this
30 point in the order lifecycle, the card is in either the activated 136 or sold 135 state (see FIG. 3). Finally, orders may become retired (block 168) when payment has been received for the order.

As discussed above, products may be programmed into cards during enabling (step 152).

In one embodiment, a product may be represented on the card as a particular code, for example, as a 32 bit number. An important feature of the system may be that
5 no list of promotions may be included on the card. Rather, the card is programmed with a product code that defines the promotions for which the card is valid.

Referring again to FIG. 2, the system may include a database 126. According to one embodiment, inside the database 126, product definitions may be maintained as lists of promotion codes, for example, as lists of 32 bit numbers. These lists may be changed
10 at the database 126 without changing the product codes on the cards. For example, if a product code X includes promotions A, B and C, then it may be changed, in the database, to include promotion D as well. Thus, a card that is programmed with product code X may now be used to access promotion D without any change needing to be made to the card (after the terminal has connected to the database to receive the updated information;
15 e.g., after a nightly updating over a network).

In this fashion, a product can be changed even after a card has been enabled and sold and a card already programmed with a particular product code can be used at a terminal with new or modified promotions, as is discussed in more detail below. System operators can add, subtract or modify the individual promotions in a product (thus
20 changing the product definition) without access to the card. This allows the system manager to alter products without recalling sold cards and reducing or avoiding inventory problems with “out-of-date” cards.

According to one embodiment, the system manager may install one or more reward terminals 120 at each partner attraction. The reward terminal 120 may be a smart
25 card enabled point of sale terminal adapted to read cards 124 presented to it and indicate whether or not a card-visitor 122 has access to the attraction. More specifically, the reward terminal 120 may include a storage element, such as a computer-readable memory device, that may contain a list of promotions that may be valid at that reward terminal. For example, a reward terminal located at a museum that is a partner attraction
30 may store several promotions (e.g., access to the museum, access to special exhibits, access to an Imax theatre, and discounts at the museum restaurant) that may be offered by the museum to card-visitors. When the card 124 is “swiped” or “dunked” at the

reward terminal 120, the reward terminal 120 checks to see if the card 124 is still valid (e.g., has not expired), whether the card is supported at the terminal and whether the promotions in the terminal are available to the card-visitor. If a promotion is valid, then it may be offered and a reward may be displayed. If more than one promotion is valid, then an attendant may make a choice and the appropriate reward may be given.

The term “reward” as used herein refers to a signal or indication that a card-visitor has chosen to access an offered promotion. In other words, a card-visitor receives a “reward” when the card-visitor uses the card to access a promotion. A promotion, as stored in the system, may have a title and a reward. The title may be used to identify the promotion. For example, a card-visitor who swipes his/her card at a reward terminal may be offered a promotion having a title “admission to museum.” The reward is used to reward the card-visitor, namely to indicate to attendants at the partner attraction that the card-visitor is entitled to the selected promotion. During normal operation of the system, an attendant, or the card-visitor, may select a promotion by its title and may be told the reward by the promotion reward. A card may have a certain number of rewards based on the product associated with that card. In other words, a product comprises a list of promotions and each promotion may correspond to one or more rewards. For example, as discussed above, promotions may be frequency or quantity limited which may determine how many rewards that promotion may give to any card.

The reward terminal 120 may be any suitable type of smart-card enabled terminal. Some examples of reward terminals that may be used in the system include point of sale terminals manufactured by Hypercom, Verifone or Lipman. One specific example of a reward terminal 120 that may be used in the system is an Allegro 100 terminal from Intellect. However, the system is not limited to any specific type or model of terminal. In some embodiments, automatic dispensers including card-readers may be provided so that a separate line may be used to gain access (e.g., a dispenser to issue tickets), offering the possibility of reduced waiting times for card-visitors.

Referring again to FIG. 3, in this example, cards become “activated” when a card-visitor first swipes a card at a reward terminal. The day of activation may be recorded on the card so that, from that day, the card may be valid for the pre-programmed card time period. These time periods (e.g., a day) may be computed from the time of activation (e.g., a 24-hour period) or may correspond to window within, for

example, a 24-hour period, such as the time from when the card was activated up until, for example, midnight on the day it was activated.

Referring to FIG. 6, there is illustrated one example of a flow diagram showing activation of a card by a reward terminal 120. In this example, the card is “activated”
5 (for purposes of determining when the card then expires for cards that expire based on a time period) on first use. For cards that do not expire, it may be that the card need not be activated after it is initially set up or the card may be activated at the point of sale. Other activation events are possible as well.

Other expiration events are also possible. For example, a card may expire after a
10 certain amount of use (e.g., aggregated and stored on the card). One such embodiment would be to set the card to expire after \$50 of aggregated use at attractions, where the value of aggregated use is stored on the card. For example, a card may be encoded with a product that includes both a list of promotions (use of which is subject to promotion constraints) and a fixed money amount for travel or food, for example. In this case, the
15 card may expire for use associated with food or travel when the fixed money amount is reached, but may remain valid for accessing promotions. Another expiration event could be, for example, non-use for a certain period or a use (or attempted use) after a certain date or time of day. In another example, a card may expire when all its rewards have been used up. Other expiration events may be some algorithm or formula based on these
20 or other factors.

Returning to the example of FIG. 6, when the card-visitor (or an attendant at a partner attraction or special-offer partner) swipes the card in the reward terminal (step 170), the reward terminal identifies the card (step 172) as a system card (i.e., an enabled card).

25 If the card is not recognized, an error is displayed (step 174) and no reward may be given to the card-visitor.

In a next step 176, the reward terminal may read the activation timestamp on the card. If the activation stamp is blank (or has some other entry indicating that it has not been activated), then this is the first use of the card, and the reward terminal proceeds to
30 step 178, where the reward terminal writes the activation timestamp into an appropriate field on the smart card. Once the activation has been recorded, the reward terminal may

proceed to determine the promotions available to the card-visitor, as is discussed in more detail below.

If, in step 176, the activation stamp contains a date, then this card has been activated before and the reward terminal proceeds to step 180 to check the activation. In
5 step 180, the reward terminal reads the activation timestamp from the smart card and reads the card period from the smart card. If the current time is less than the activation timestamp plus the card period, then the card is valid and the reward terminal may proceed to determine the promotions available to the card-visitor. If the current time is greater than the activation timestamp plus the card period, then the card has expired. If
10 the card is expired, the reward terminal may display a "card expired" message to the user and discontinues card processing (step 182). Other embodiments, e.g., where activation any time during one time period (e.g., any time during the day) causes expiration at the end of that time period may likewise be implemented, e.g., where a use at any time during a day causes the card to expire at the end of that day.

15 As discussed above, one of the components of the system may be a reward terminal 120. A reward terminal may include a user interface such as a screen and keyboard and swipe slot for cards. The reward terminal may constantly or regularly check for user activity which may signal that a card-visitor is attempting to use the reward terminal or that an operator is attempting to, for example, query the number of
20 records currently stored on the reward terminal (indicating how many promotions have been accessed that day at that reward terminal). When a card is swiped at the reward terminal, the reward terminal may begin to implement a procedure for processing the swipe.

Referring to FIG. 7, there is illustrated a flow diagram of one example of a
25 procedure that may be implemented by a reward terminal when a card-visitor attempts to use a card to access a promotion. The card-visitor 122 may give the smart card 134 to an attendant or operator who swipes the card into the reward terminal 120 (step 200), or may dunk the card themselves in an automated kiosk. As discussed above, the reward terminal may check the activation state of the card and may proceed if the card is valid
30 (step 202). Next, the reward terminal may read the product code from the smart card (step 204).

The example of FIG. 7 may be more easily understood with reference to one example of a memory structure for a smart card. Referring to FIG. 8, there is illustrated a conceptual diagram of information that may be stored in a memory structure of a smart card that may be used with one embodiment of the system. The smart card memory may contain several “properties” fields that contain information relating to the properties of the card, such as its serial number, period, type and programmed product code. As discussed above, each card may have a unique serial number that identifies a particular card in the system.

When the card is swiped in a reward terminal (step 200), the reward terminal may record this serial number along with the date and a promotion code for later transmission to the database 126, an example of which is described below. The “period” field may include a number indicating how many days the card is good for starting at midnight of the day of first activation. The reward terminal may use this number to determine if a card is still valid in step 202.

The “type” field in this example indicates the card type (e.g., adult, child, senior, etc.). This type code may be used to display the card type to the attendant when necessary. For example, a reward message might be “admin one adult” and the “adult” part is determined from this field. As discussed above, the product code indicates what product the card supports. The reward terminal may use the product code, in step 204, to find the list of promotions that are valid for the current customer.

Referring again to FIG. 7, once the reward terminal has read the product code from the card, the reward terminal may scan a list of available promotions loaded in the memory of the reward terminal (step 206). Each reward terminal may be programmed with a list of promotions that may be accessed via that reward terminal. This list may correspond to a list of the promotions offered by the partner attraction at which the reward terminal is located. The reward terminal may then form a list of candidate promotions (step 206) that are included in the product identified in (as read from) the card (e.g., matching the product code). If the list of candidate promotions is empty, then the operator may be told that no promotions are available and the process may be terminated. If the list contains one or more candidate promotion, then processing proceeds.

In this embodiment, in a next step, the reward terminal may scan the list of candidate promotions and compare them with the time criteria for each promotion (step 208). If the promotion fails the time criteria, for example, it is the wrong time of day or day of the week for a card-visitor to access that promotion, then the promotion is
5 dropped from the candidate promotion list. After the time criteria have been applied, if the candidate list is empty, then the operator may be told that no rewards are available and the process may be terminated. If the candidate list has more than one entry, then the title of each available promotion may be presented to the operator and the operator may select which promotion to process (step 210). If there is only one available
10 promotion, then the title of that promotion may be displayed, and the terminal may proceed with processing that promotion.

After a promotion has been selected for processing, the reward terminal may check to see if any frequency (step 212) or quantity (step 214) restrictions exist for that promotion. It is to be appreciated that although the flow diagram illustrated in FIG. 7
15 check frequency constraints first and then quantity constraints, the method is not so limited and the steps may be performed in any order configured by the system manager. If the selected promotion has a frequency constraint, then the terminal may apply a frequency constraint test (step 216).

According to one embodiment, a frequency constraint test may be conducted as
20 follows. The reward terminal may read the date from the card and check to see whether it matches the current date (step 212). If the current date does not match the date on the card, then the frequency list on the card is old and the card passes the frequency constraint and the reward terminal may continue processing at step 214. If the current date does match the date on the card then the frequency list on the card is valid and may
25 be examined to determine if the promotion passes. In one example, the reward terminal may scan the frequency list on the card looking for the promotion code of the selected promotion. If no promotion code is found, then the card passes the frequency constraint and the reward terminal may continue processing at step 214. If the promotion code is found, then the reward terminal may examine a frequency counter (step 218) on the card
30 in the frequency list that includes the promotion code. If the frequency counter is less than the frequency constraint, then the promotion passes and the reward terminal may continue processing at step 214. If the card's frequency counter is equal to the frequency

count, then the promotion has been used and the reward terminal may display a message to tell the operator that the reward has already been used for the day (step 220) and processing is terminated. In one example, the reward terminal may store the promotion code and frequency counter in its memory for later update of the card state, as is
5 discussed in more detail below. As one of ordinary skill would appreciate based on the disclosure provided herein, any number of possible frequency constraints maybe imposed for a particular promotion and the mechanisms for storing and tracking frequency constraints using the memory of a card device may be varied. As just one example, a frequency constraint may be depend on more than one variable, such as
10 allowing a larger number of uses (or unlimited use) on weekdays, and lower frequency on weekends.

Returning to this example, once the reward terminal has processed any frequency constraints, the reward terminal may check to see if the selected promotion has a quantity constraint (step 214). If the promotion does not have a quantity constraint, then the
15 reward terminal may proceeds to step 224 to update the card state in the card memory, as is discussed in more detail below. If the promotion does have a quantity restriction, the reward terminal may scan the quantity list on the card looking for the promotion code of the selected promotion. If no promotion code is found, then the card passes the quantity constraint and the reward terminal may proceed to step 224. If the promotion code is
20 found, then the reward terminal may examine a quantity counter (step 228) for the entry in the quantity list that contains the promotion code. If the card's quantity counter for that promotion is less than the quantity constraint, then the promotion passes and the reward terminal may proceed to step 224. If the card's quantity counter for that promotion is equal to the quantity count, then the promotion has been used and the
25 reward terminal may display a message to tell the operator that the reward has already been used and processing is terminated (step 230). In one example, the reward terminal may store the promotion code and quantity count in its memory for later update of the card state, as is discussed in more detail below. As for frequency counters, the quantity counter tests may be formed from as logical tests, such as permitting any use after the
30 first one only a weekday or a weekend day after 4pm.

Once processing has been completed and the reward terminal has determined that the card-visitor is entitled to access the selected promotion (i.e., card is valid and all

time, frequency and quantity restrictions have been passed), the reward terminal may display the promotion reward for the operator (step 234).

Referring again to FIG. 8, the card may include an activation timer field that indicates the date and time when the card was first activated. As discussed above, when the card is first swiped through a reward terminal, the reward terminal may write the system time into this field. In one embodiment, the reward terminal may maintain the system time as the number of seconds since the beginning of the epoch. The epoch may be defined to begin at a time when the system is launched in a destination, or another time selected as suitable by the system manager. On all subsequent swipes of a card after the first swipe, the reward terminal may read the activation system time from the card and add the card period in seconds. For example, for a two-day card, the card period may be 172800 seconds. If the sum of the activation system time and the card period is less than the current system time, then the card has expired. Of course, it is to be appreciated that the system is not required to maintain records of system time in seconds but may instead use a different time tracking method; similarly, for embodiments that expire based on time, other measure may be used such as having all one-day cards expire at 11:59pm on the day of first use (no matter what time the card was first used). In one example, the reward terminal may be configured to account for leap years in its time tracking method. In another example, the reward terminals may not account for daylight savings, in order to facilitate moving of reward terminals from one location to another, and thus may receive daylight savings time information from a central computer, as is discussed in an example below.

According to one embodiment, the card may also include in its memory one or more counters. For example, a card may include a quantity counter and a frequency counter. In one example, the quantity counter may include a number that indicates the number of quantity promotions currently included in the product stored on the card. As discussed above, promotions may be limited in either quantity or frequency or both and may also be unlimited in both quantity and frequency. For a promotion that is limited to a specific number of uses during the lifetime of the card (a quantity limited promotion), the promotion code may be recorded in a quantity list on the card. As discussed above, whenever a card is swiped at a reward terminal, the reward terminal may check to see if the promotion quantity has already been used by that card-visitor (step 214, FIG. 7). The

card may also include a frequency counter that may include a number that indicates the number of frequency promotions currently included in the product code stored on the card. For promotions that are limited to a specific number of uses per day (a frequency limited promotion), the promotion code may be recorded in a frequency list on the card.

5 Whenever a card is swiped at a reward terminal, the reward terminal may check to see if the promotion frequency has already been used by that card-visitor (step 212, FIG. 7).

In one example, the card may also store an indication of the current day of the month. As discussed above, the terminal may use this day indicator to determine if any of the entries in the frequency list are valid (step 212, FIG. 7). If the current day on the
10 terminal is not equal to the current day on the card, then the list on the card is considered old and is ignored. If a frequency promotion is consumed, then a new list may be started on the card and the current day field may be reset to the current day on the terminal.

As discussed above, the card may store a frequency list which may be a list of frequency promotions that have been used by the card-visitor during the current day.

15 According to one example, the frequency list may contain number pairs. The first number of a pair may indicate the number of times the promotion has been used (i.e., may correspond to the promotion counter). The second number of the pair may be used to indicate the promotion code. When a reward terminal checks to see if a frequency promotion is available, it may scan this list for the applicable promotion code (step 216).
20 It may then compare the number of times the promotion has been used with the promotion limits (step 218). If no more rewards are available, the reward terminal displays the "no more rewards" message (step 220). If more rewards are available, then the reward terminal may increment the promotion counter (step 224) and display the reward message (step 234).

25 Similarly the card may store a quantity list which may include a list of quantity promotions that have been used by the customer during the lifetime of the card. Like the frequency promotion list, the quantity list may comprise number pairs. The first number may indicate the number of times the promotion has been used (i.e., may correspond to the promotion counter) and the second number may indicate the promotion code. When
30 a reward terminal checks to see if a frequency promotion is available, it may scan this list for the promotion code (step 226). The reward terminal may then compare the number of times the promotion has been used with the promotion limits (step 228). If more

rewards are available, then the terminal may increment the promotion counter (step 224) and display the reward message (step 234). If no more rewards are available, then the reward terminal displays the “no more rewards” message (step 230).

As discussed above, the reward terminal may, in step 224, update card properties
5 and counters on the card before displaying the reward and terminating processing of the card. For example, the reward terminal may update the frequency and quantity list information on the smart card to indicate that one more promotion has been consumed. Such updating may prevent “double-swiping” from occurring in the system.

According to one embodiment, the system may be an “offline” system or a batch
10 processing system, where the reward terminals do not require access to a central database at the time of card use (unlike online credit card systems, for example, which are authorized at a central location on a per-use basis).

“Double swiping” as used herein refers to a card being swiped twice at the same
attraction. This can happen if the card is used twice at the same reward terminal or used
15 again at another reward terminal with the same promotion. For example, some attractions may have multiple entrances and so have more than one reward terminal installed with the same promotions. To prevent “double swiping,” the reward terminal may record the promotion code and count on each card that is processed in the system. As discussed above, the reward terminal may apply a series of constraints to a card to see
20 if it can be used to satisfy a promotion at the reward terminal. In the embodiments discussed above, two of these constraints may involve how often and how many times the card has been used. Since the cards used in the system are smart cards, it is possible to record how many and how often a particular promotion has been used in the card’s promotion counters. Each time a promotion is used, its counter may be incremented on
25 the card by the reward terminal. Thus, to prevent double swiping, the reward terminal may find the promotion count of the current promotion on the card and test to see if it meets or exceeds the limit of how many rewards the card-visitor is entitled to. The reward terminal will not offer a reward if the promotion count has reached its limit, thereby preventing double-swiping. As may be appreciated, frequency limits may also
30 prevent or discourage double-swiping by preventing two people from visiting the attraction at the same time.

In addition to writing updated information to the card, the reward terminal may store in its memory device information such as, for example, the date and time when the reward is issued, the serial number of the card used and the promotion code of the promotion consumed. This information may later be transmitted to the database 126.

- 5 When the reward terminal is not processing a user request, such as a request for access to a promotion, the reward terminal may enter an “idle” mode wherein it may display, for example, the system manager logo and instructions for how to swipe a card at the reward terminal.

- Referring again to FIG. 2, the system may include a gateway 200 that may
10 communicate with the reward terminal 120 as indicated by lines 202. According to one embodiment, the gateway 200 may be a standard personal computer or mainframe computer that may be running an operating system such as Linux or Microsoft WindowsTM. In a preferred example, the gateway may include a PowerEdge 400SC from Dell running Red Hat versions 9 Linux. However, the system is not so limited and
15 it is to be appreciated for example that any server grade computer from any of the major manufacturers including, for example, Gateway, Dell, HP, IBM and the like, may be used in this example of the system. Likewise, any major Linux distribution may be used including SuSe, Mandrake, Debian, and others in addition to Red Hat. The gateway may form an interface between the reward terminals and the central database 126. It is to be
20 appreciated that although the gateway and the database are illustrated in FIG. 2 as separate and discrete items, the database may be a storage element located on or attached to (e.g., an external hard-drive) the gateway computer and need not be physically separate from the gateway.

- The gateway may contain a number of programs that are configured to control
25 data flow between the enabler, the reward terminals, the database and the gateway. According to one embodiment, these programs may include, for example, a loading program that may be, for example, a script program, that may be run daily to process files uploaded to the gateway from the enabler and the reward terminals. The load program may include any necessary information for the gateway to properly
30 acknowledge each terminal and may manage where received files are stored in the gateway's storage device. Another program may be, for example, a generate program that may generate the loading script program. The generate program may query the

database for a list of active terminals and generate an upload processing script that includes those terminals. In one example, the act of generating the upload script may be called “generating a new network.” New networks may be generated at various times, for example, when a new partner attraction or special-offer partner is added to the system or when a new promotion is added or changed at an existing partner attraction or special-offer partner. Another program that may be included in the gateway is a “snapshot” program. The snapshot program may generate an email that is a snapshot of current network activity. In one example, the snapshot program may be run automatically every day to give the system manager a quick view of the significant activity in the system for the previous day. This may be useful for getting a quick idea of how many customers used the system, what they did and what terminals were used. Alternatively, a system manager operator may request that the snapshot program be run, rather than automatically running the snapshot program.

According to one embodiment, reward terminals 120 and the enabler 140 may communicate with the gateway via phone lines or direct serial links, as indicated by lines 202 in FIG. 2. It is to be appreciated that although the following discussion may refer primarily to communication between reward terminals and the gateway, the same principles may apply to communication between an enabler and the gateway. Reward terminals 120 may log into the gateway computer 200 using a remote login, for example, a Unix style remote login. Once connected and recognized by the gateway computer 140, the reward terminals 120 may invoke a gateway program to perform the communication protocol. In one example, the protocol allows for the reward terminal 120 to send its stored records to the gateway 200.

As discussed above, during enabling of a new card, the enabler stores in its memory a record containing the card properties and the card serial number (step 154, FIG. 4). According to one embodiment, these stored records may be uploaded to the gateway 202 and then stored in the central database 126. In one example, each day, the card enable records may be batched up and sent to the gateway 200. Similarly, when an activated card is swiped in a reward terminal, a record containing the card serial number and promotion code used is stored in the reward terminal’s memory. Each day, the transaction records may be batched up and sent to the gateway 200.

It is to be appreciated that the system may allow for records to be sent to the gateway more (or less) frequently than once a day and may operate always or part of the time in an "online" mode wherein records may be continually, or semi-continually, sent to the gateway. However, in one example, the system may operate as an "offline" system that only requires batch processing. In this example, records may be stored at the enabler and at the reward terminals and uploaded to the gateway once a day (or once every time period, that time period being selected by the system manager and possibly being longer or shorter than one day). It is also possible to allow an attraction to trigger an upload where, for example, an attraction is added during the day or where an exchange of data is required for debugging, customer service or some other need.

One example of a procedure for sending records from either the enabler 140 or the reward terminal 120 to the gateway is illustrated in FIG. 9. It is to be appreciated that for the purposes of this explanation, the term "terminal" may be used to refer to the enabler, the reward terminal, or a kiosk or other device that includes the functionality of one or both.

To begin a batch upload, an operator may initiate communication between the terminal and the gateway, or the terminal may initiate communication on its own at a preprogrammed time. In one example, the terminal may communicate with the gateway over a phone line. In this example, the terminal may initialize a modem and dial a phone number of the gateway (step 204). If the gateway does not respond, the terminal may terminate the process and display an error (step 206). Once the gateway has been reached, the terminal may log into the gateway by giving it a username and a password, for example, using Unix rlogin (step 208). If the gateway does not recognize the terminal, then communication may be terminated and the terminal may display an error (step 206). When the terminal has connected to the gateway and logged in, the terminal may invoke the gateway program (step 210) to handle the communication protocol, as discussed above. If the gateway does not start the program, then the communication is terminated and the terminal may display an error (step 206).

In a next step, the terminal may send its stored records to the gateway (step 212). In one example, each byte of a record may be compared with an echoed character and each record may be validated, e.g., by checksum. If a record transfer does not succeed, then communication is terminated and the terminal may display an error (step 206). If

the record transfer is successful, the gateway may write the records to its memory (step 214) or an attached storage device. For example, the gateway may write the received records in an ASCII file which may be called a terminal data file and include a serial number of the terminal as its name with the extension “.in” to indicate that it is an
5 incoming record file.

In a next step 216, the gateway may send a record containing the current time and date to the terminal. This record may also be validated with checksum and further security or validation mechanisms may also be included. If the record transfer does not succeed, then communication is terminated and the terminal may display an error (step
10 206). Once the terminal has received the date and time from the gateway, it may update its internal records by setting its time and date to the information received from the gateway. In this manner, all terminals may be controlled to maintain the same system time that is regularly received from the central gateway. This may eliminate the potential of time drift among the different reward terminals which could potentially
15 cause problems with properly validating cards at the reward terminals.

In one embodiment, the gateway may also send a stored configuration to the terminal (step 218). The configuration may be stored in, for example, an ASCII file that includes the terminal serial number as its name with the extension ‘.out’ to indicate that it is an outgoing configuration file. As discussed above, each byte may be compared with
20 an echoed character and each record may be validated with checksum. If a record transfer does not succeed, then communication is terminated and the terminal may display an error (step 206). The configuration file sent to each terminal may include, for example, updated product definitions that may add or subtract promotions from products. As discussed above, by implementing the product system wherein product definitions are
25 stored on the reward terminals, the system manager is able to modify products by reconfiguring the product definitions at the reward terminals without needing access to the cards. Once the terminal has received the configuration file, the terminal may delete its old configurations and configure itself to the information downloaded from the gateway (step 220). The terminal may then clear its memory of all records that have now
30 been sent to the gateway and is ready to store new records.

It is to be appreciated that the configuration may also be sent to the terminal before the date and time is sent rather than afterwards as illustrated in FIG. 9. In this

example, the gateway may acknowledge the transmission of records from the terminal to the gateway and sends the current terminal configuration. The terminal may acknowledge receipt of the configuration file and ask for the current date and time. The gateway may then send the date and time, after which the terminal may acknowledge receipt and terminate the connection. As discussed above, all transmissions may be verified via checksum and handshake.

According to one embodiment, the terminal may continually or regularly check to see if it is time to call the gateway. As discussed above, each day at a predetermined time, the terminal may attempt to establish communication with the gateway. If it is successful, the terminal may follow the procedure described above, or a similar procedure, to transfer records to the gateway and receive configuration information from the gateway. In one example, if the terminal is not successful in establishing communication with the gateway, it may proceed with a second attempt. For example, if the terminal and the gateway are communicating via a phone line, the terminal may attempt to call a secondary number for the gateway or may try to call again at a later predetermined time. The system manager may configure the terminal to attempt to contact the gateway a set number of times after which, if all fail, it may display an error.

Referring again to FIG. 2, the gateway computer 140 may upload 222 and download 224 information to and from the database 126. According to one embodiment, the gateway may run an upload program once a day (or once every predetermined time period which may be longer or shorter than one day) to store any records uploaded from the enabler 140 and the reward terminals 120 in the database 126. The upload program may be, for example, a C program that reads the record files sent by the terminals and stores the information in the database via SQL. However, it is to be appreciated that the upload program may be written in a language other than C and may use a different process to transfer data between the database and the gateway than is described herein. One example of a procedure for uploading a terminal data file from the gateway to the database is given below. However, one of skill in the art will recognize that there are many different methods for transferring data between computers and storage devices and the system is not limited to the example given below. In addition, as discussed above, the database and the gateway may reside on the same computer base and ordinary methods known in the art may be used to access and store data in the database.

Referring to FIG. 10, there is illustrated in flow diagram form one example of a procedure for uploading information from the gateway computer 140 to the database 126. In a first step 230, the upload program may open the terminal data file to obtain data from the terminal file. A terminal file may be a record file received by the gateway
5 from either a reward terminal or the enabler. Next, the upload program may read the terminal report timestamp record and store that time (step 232) in a report log table of the database, which is described in more detail below. This table may contain the report history of a terminal. In one example, the upload program may read a terminal record (step 234). If that terminal record is a card enable record (received initially from the
10 enabler), then the upload program may read the timestamp, serial number, period, type and product code of the card enable record (step 236). The upload program may then locate the card in the database card table that has that serial number and update its properties to reflect the properties of the card as specified by the card enable record (step 240). If the card cannot be found, an error may be displayed and the process terminated.
15 If the card is found, the state of the card may be updated in the database to reflect that the card is now enabled (step 242).

If step 234 reveals that the terminal record is a transaction record from a reward terminal, the upload program may read the timestamp, serial number, and promotion code of the transaction record (step 244). The upload program may then locate the card
20 in the database using the serial number (step 244). If the card is not found, an error may be displayed and the process terminated. If the card is found, a record may be added to the transaction table in the database that contains a reference to the card record in the card table and the transaction properties (step 248). The process may be repeated until there are no more records to upload.

25 Similarly, when required, an operator may run a program on the gateway computer that generates new terminal configuration files from the database. The gateway may then send these configuration files to the terminals, as discussed above. According to one example, the download program may operate similarly to the upload program and may be a C program that reads terminal configuration information from the
30 database and stores it in ASCII files. These files may be named as the serial number of the terminal plus the extension "out," as described above. According to one example, the download program may connect to the database and find an appropriate terminal in the

terminal table by serial number. The download program may write the auto dial time (for the terminal), terminal time zone and dialing prefix to the configuration file. In addition, the download program may write account information, such as, for example, the phone number, username and password of the Gateway, to the configuration file.

- 5 The download program may also find the set of promotions assigned to the terminal and write their properties, such as time, frequency and quantity restrictions, to the configuration file. Furthermore, the download program may locate the set of products that may be enabled with the terminal and write their properties to the configuration file. Thus, the configuration file may contain all information necessary for the terminal to properly process a card presented to it.

- 10 One of ordinary skill in the art would appreciate, based on this disclosure, that there would be many methods for controlling data transfer between a computer and a database and the system is not limited to the specific example given above. In addition, as discussed above, the database may in fact be a storage device that is located at the gateway computer. In this case, methods known in the art may be used by the gateway computer to access the database and obtain information therefrom or write information thereto.

- 15 As mentioned above, according to one embodiment, the database 126 may contain a number of tables in which card records, product definitions and other information may be stored. For example, the database may include a company table that may contain the properties of all partner attractions and special-offer partners participating in the system. Some of these properties may include, for example, relationships between companies (partner attractions or special-offer partners) and their venues (e.g., whether a company has one or multiple venues, where their head office is located, etc.)

- 20 Another table that may be included in the database is a card table that may hold the properties of all cards that are currently known to the system. For example, the card table may hold the serial number of each card. After the card has been enabled, the card table may contain the card properties (type, period and product) associated with the serial number. In addition, product and company properties may be included in the card table as references to other tables.

Another table that may be included in the database may be a transaction table that may hold records of all the processed swipes in the system. The transaction table properties may include the time and date of each swipe and the location (i.e., the terminal) where the swipe occurred. Transactions may also reference what card was
5 used and what promotion was used.

In addition, the database may include a promotion table that holds the definitions of all the promotions offered by the partner attractions and the special-offer partners. The promotion definitions may include the title and reward of the promotion and the constraints (e.g., time, quantity and frequency) of the promotion. Promotions may also
10 reference the company (or more accurately, the venue of a company) offering the promotion. This may be done by including in the promotion table references to the company table.

The database may also include a product table holds the definition of the products offered in the system. The product definitions may include a name and a description and
15 the and “one-to-many” table may relate what promotions are included in what products. The card table may reference the product table to tie cards to a particular product, i.e., a list of available promotions. In one example, the actual product code programmed into a card may be used as the product table identifier.

Thus, the database, in these and other tables, may keep a record of what is
20 happening in the system, including changing product definitions and data relating each transaction (such as a request to access a promotion) that occurs in the system.

This data may be useful to the system manager, to partner attractions and/or to special-offer partners. For example, the card data may include information about the purchaser of the card such as, age bracket, home country if the customer is a foreign
25 tourist or home city if the customer is a domestic tourist, etc. The data may also include a record of all promotions accessed by that card and therefore that customer. Therefore, considering all the data for all cards in the system, users may be able to create statistics about card-visitor demographics. For example, a user may be able to determine that adult card-visitors from England typically visit museum x, take a city tour and hardly
30 ever go to Imax theatres. For another example, a user may be able to determine that card-visitors with children (i.e., customer has bought an adult card and a child card) prefer museum Y, but also usually take city tours. This information may be useful to the

system manager to better configure the system to add value for customers. The system manager may also choose to sell or provide the information to partner attractions and/or special-offer partners so that they may be able to tailor promotions to encourage visitors. This information may also be provided or sold to third-parties, although in many
5 instances measures may be taken to assure that the privacy of customers is preserved, such as assuring that no data is provided to any third-party or attraction that allows an individual customer to be identified.

According to another embodiment, because product definitions may be maintained at the central database, the system may include products from other
10 competing companies that may be adapted to become system manager products. In other words, because product definitions may be changed by the system manager without access to the cards, there is no inventory required to create and offer new products. Therefore, the system manager may create, in the central database, products that may include offerings from other companies and that may be accessed using the same cards.
15 Through the central database, terminals may be updated to recognize different types of cards and different products without any need to modify the cards or the system infrastructure.

Referring again to FIG. 2, the system may include a central user interface 250. Via the user interface 250, a system manager controller may access the system network
20 and run programs on the gateway or store or retrieve data from the database 126. It is to be appreciated that although the gateway 140, the database 126 and the user interface 250 are illustrated in FIG. 2 as separate units, they may all be combined on a single (or distributed) central computer.

Referring to FIG. 11, there is illustrated one example, of a graphical user
25 interface 252 that may be presented to system manager users on the user interface 250. In the illustrated example, the interface 252 may operate using a selection of “managers.” However, it is to be appreciated that the graphical user interface may be implemented in any number of ways as may be desired by the system manager.

According to one example, the interface 252 may include an “Inventory
30 Manager” option 254 that may allow system operators to control and view cards, terminals and gateways used in the system. With the inventory manager, a user may add, modify and assign cards, add and/or modify terminals and add and/or modify gateways.

Although terminals and gateways are may changed only rarely, cards may be frequently modified in response to changing business needs and customer service. The user interface may also include a product manager option 256 that may be used to add and/or modify products. This includes the ability to set prices and include/exclude vendor offers. In addition, the user interface 252 may include a sales manager option 258 that may be used to control and view the sales channels in the system. The system operator can add and/or modify sales channels and view orders. The user interface 252 may further include a vendor manager option 260 that allows the system operator to control and view the vendors (namely partner attractions and special-offer partners) in the system. The vendor manager may be used to add and retire vendors, to add and/or modify vendor promotions and to view vendor activity. It is of course to be appreciated that the user interface may also include other and different menu options or may label menu options differently than is illustrated in FIG. 11. The important principle of the interface 250 is to provide the system manager operators with a convenient access to the system network to control and modify the system as needed or desired.

Having thus described several aspects of at least one embodiment of this invention, it is to be appreciated various alterations, modifications, and improvements will readily occur to those skilled in the art. For example, although the system has been described primarily in terms of smart card technologies, the system may also operate with another form of user code. For example, instead of smart cards, card-visitors may be provided with a unique PIN or with a card printed with a barcode rather than having any embedded technology. As may also be appreciated based on this disclosure, aspects of the present inventions may be implemented using software stored on a computer readable medium such as a compact disk, hard drive or memory stick or in special purpose hardware. It should also be understood that the functionality of various of the components in the examples described above may be combined or divided in various ways, such as having a card enabled and reward terminal combined into a single unit or dividing the system management functions among multiple computers. Such and other alterations, modifications, and improvements are intended to be part of this disclosure, and are intended to be within the scope of the invention. Accordingly, the foregoing description and drawings are by way of example and explanation only and are not

intended to be limiting. The scope of the invention should be determined from proper construction of the appended claims, and their equivalents.

What is claimed is:

CLAIMS

1. A terminal for use in accessing a facility, the terminal comprising:
a smart card data mechanism to read and write information on a dunked smart
5 card;
a verification mechanism to receive an identifier on the dunked smart card and to
determine whether the dunked smart card is authorized to access the facility; and
a network access mechanism to connect to a remote system management
computer to upload to the remote system management computer data corresponding to
10 use of the facility by authorized smart card holders during a time period.
2. The terminal as claimed in claim 1, wherein the facility is a promotion.
3. The terminal as claimed in claim 2, wherein the promotion is a paid attraction.
15
4. The terminal as claimed in claim 2, wherein the promotion is a special-offer.
5. The terminal as claimed in claim 1, wherein the terminal is configured to
periodically connect to the remote system management computer via the network access
20 mechanism.
6. The terminal as claimed in claim 1, further comprising a first use activation
mechanism to record an activation stamp on the dunked smart card when the dunked
smart card is dunked for a first time.
25
7. The terminal as claimed in claim 6, wherein the verification mechanism is further
configured to check the activation stamp on the dunked smart card to determine whether
the dunked smart card is expired.
- 30 8. The terminal as claimed in claim 1, wherein the verification mechanism further
includes a frequency checker

9. The terminal as claimed in claim 1, wherein the verification mechanism further comprises a quantity checker
10. A smart card for use in a geographical product, the smart card comprising:
5 a body portion;
a memory in or attached to the body portion, the memory including:
a first data structure to store a card identifier; and
a second data structure to store a product identifier, the product identifier
corresponding to a set of promotions available in the geographical product.
10
11. The smart card as claimed in claim 10, wherein the memory further includes a third data structure to store an activation stamp.
12. The smart card as claimed in claim 11, wherein the activation stamp indicates
15 whether the smart card is valid for use in the geographical product.
13. The smart card as claimed in claim 10, wherein the memory further includes a fourth data structure to store at least one counter associated with one promotion of the set of promotions, wherein the counter indicates whether the one promotion is available for
20 access with the smart card.
14. The smart card as claimed in claim 13, wherein the at least one counter includes a frequency counter that records a number of times during a predetermined time period that the smart card has been used to access the one promotion.
25
15. The smart card as claimed in claim 13, wherein the one promotion includes at least one reward and wherein at least one counter includes a quantity counter that stores a quantity of available rewards associated with the one promotion.
- 30 16. The smart card as claimed in claim 10, wherein the memory includes an additional data structure to store identifying information about a user of the smart card.

17. The smart card as claimed in claim 16, wherein the identifying information includes an indication that the user is one of an adult, child and senior.

18. A product manager system to manage a system that permits access to rewards
5 corresponding to a plurality of promotions, the plurality of promotions being included in at least one product, the system comprising:

a network interface to permit data access to reward terminals located in proximity to the plurality of promotions;

a database to store at least one product definition; and

10 a database to store data corresponding to actual use of the rewards.

19. The product manager system as claimed in claim 18, wherein the at least one product definition includes a list of the plurality of promotions.

15 20. The product manager system as claimed in claim 18, wherein the network interface is configured to enable periodic data transfer between the database and the reward terminals.

21. A method of computing compensation for an attraction based on actual use of
20 smart cards at the attraction, the method comprising acts of:

recording a number of smart cards used at the attraction during a predetermined time period;

recording a type of each smart card used at the attraction during the predetermined time period;

25 recording data associated with each smart card; and

determining the compensation based on the number, the type and the data.

22. The method as claimed in claim 21, wherein the type includes one of adult and child.

30

23. The method as claimed in claim 21, wherein the data includes a time of use of each smart card at the attraction during the predetermined time period.

24. A method of activating a smart card for use in a multi-attraction access system comprising a plurality of promotions that can be accessed, the method comprising steps of:

- 5 providing a smart card;
- storing identification information on the smart card;
- providing the smart card with the stored identification information to an end-user;
- on a first use of the smart card to access one of the plurality of promotions,
- storing information on the smart card corresponding to the first use.

10

25. The method as claimed in claim 24, wherein the step of storing information includes storing a time stamp corresponding to a time of activation of the smart card.

26. The method as claimed in claim 25, further comprising a step of checking
15 whether the smart card has expired.

27. The method as claimed in claim 26, wherein the step of checking whether the card has expired includes comparing a current time with the time stamp and indicating that the card has expired if the current time exceeds the time stamp plus a predetermined
20 time interval.

28. An access system for use with user codes comprising:
a controller configured to be coupled to at least one reward terminal and configured to provide information to the reward terminal and receive data from the
25 reward terminal once every predetermined time period; and
a database, coupled to the controller, that stores the information to be provided to the reward terminal and the data received from the reward terminal;
wherein the information includes a promotion list of promotions accessible from the reward terminal and a product list of promotions that are accessible with each user
30 code; and
wherein the data includes a list of user codes and promotions that have been processed by the reward terminal during the predetermined time period.

745689.3

29. The system as claimed in claim 28, wherein the database is configured to communicate with the at least one reward terminal with predetermined periodicity to provide the information to the reward terminal and to receive the data to from the reward terminal.
5

30. The system as claimed in claim 29, wherein the predetermined periodicity is once a day.

10 31. The access system as claimed in claim 28, wherein the user codes are encoded on programmable smart cards.

32. A computer readable medium encoded with a plurality of instructions to be executed on at least one processor, the plurality of instructions implementing a method of
15 controlling access to a plurality of attractions, the method comprising:
reading a card with a reader located at one of the plurality of attractions;
recording a unique identification number of the card;
comparing the unique identification number of the card with a product list of promotions that are accessible at the one of the plurality of attractions;
20 determining whether the card is valid for at least one of the promotions that are accessible at the one of the plurality of attractions;
for valid cards, displaying a reward for the at least one promotion; and
for valid cards, incrementing a promotion counter on the card to indicate that the reward has been given.

25 33. A method of creating a destination within a geographic location, the method comprising:
analyzing a plurality of attractions existing within the geographic location;
rating each selected one of the plurality of attractions with a popularity index;
30 building a matrix of the selected ones of the plurality of attractions, the matrix containing information about the plurality of attractions, the information including pricing information, location information and the popularity index;

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based on the matrix, selecting a plurality of partner paid attractions from the plurality of attractions;

based on the matrix, selecting a plurality of special-offer partners from the plurality of attractions; and

5 defining the destination as a collection of the selected partner paid attractions and special-offer partners.

34. A method of controlling access to a plurality of attractions, the method comprising acts of:

10 reading a card with a reader located at one of the plurality of attractions;
recording a unique identification number of the card;
comparing the unique identification number of the card with a product list of promotions that are accessible at the one of the plurality of attractions;
determining whether the card is valid for at least one of the promotions that are
15 accessible at the one of the plurality of attractions;
for valid cards, displaying a reward for the at least one promotion; and
for valid cards, incrementing a promotion counter on the card to indicate that the reward has been given.

20

ABSTRACT

A smart-card based system and methods to control access to a plurality of attractions within a geographical area. The system may include one or more reward terminals that are located at attractions and are configured to read smart cards presented to them and, assuming the card is valid for that location, allow the card holder to access the attraction. Each smart card may be programmed with a product code that defines the attractions at which the card may be used. Product codes may be stored in a central database along with a list of the attractions associated with the each product code. The list of attractions may be updated as desired, thereby updating and changing the attractions at which any given card may be used.

PROGRAMMABLE TICKETING
SYSTEM

Applicant: Tyler Brooks, et al.

Docket No.: S2013-700019

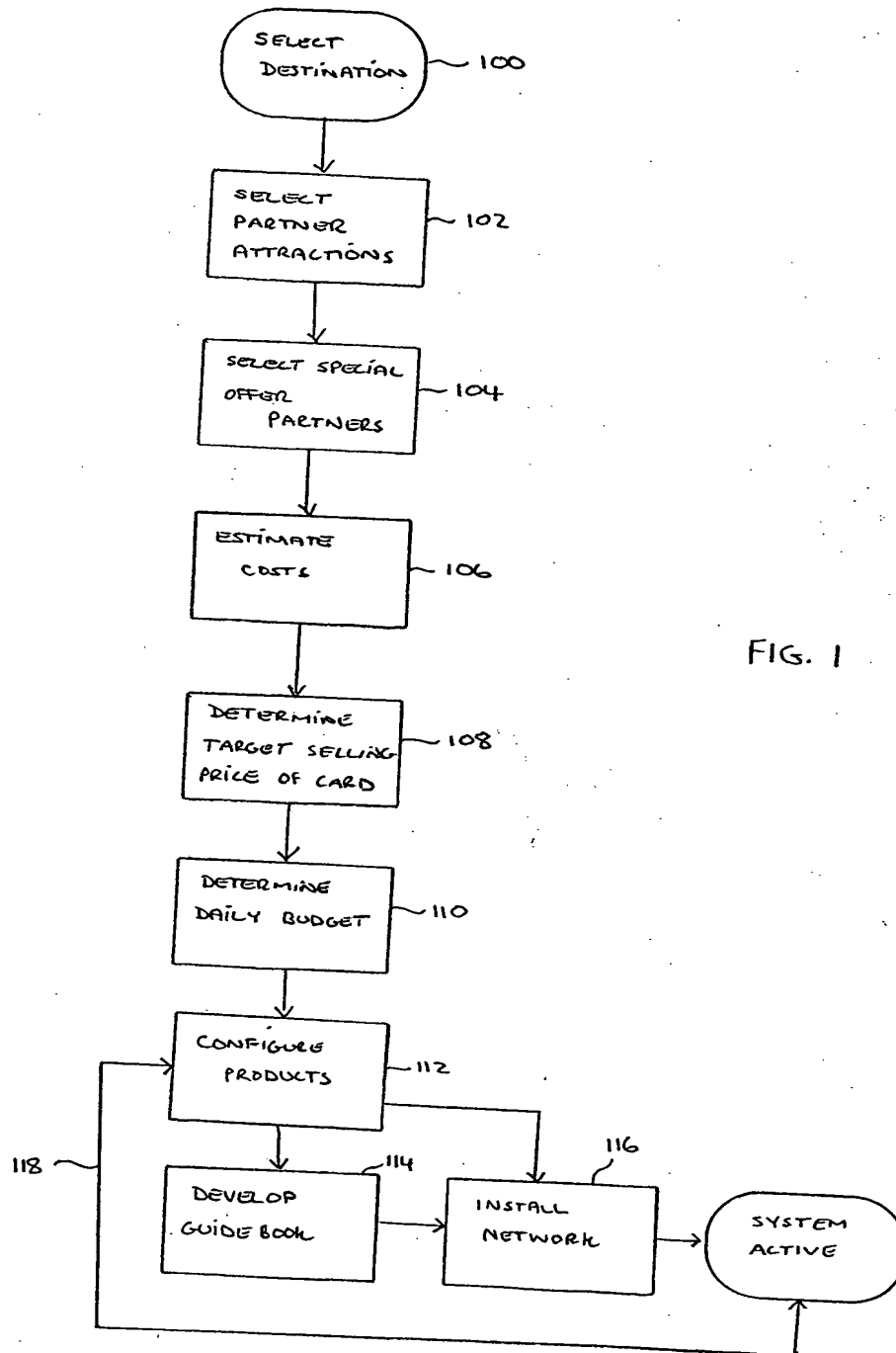
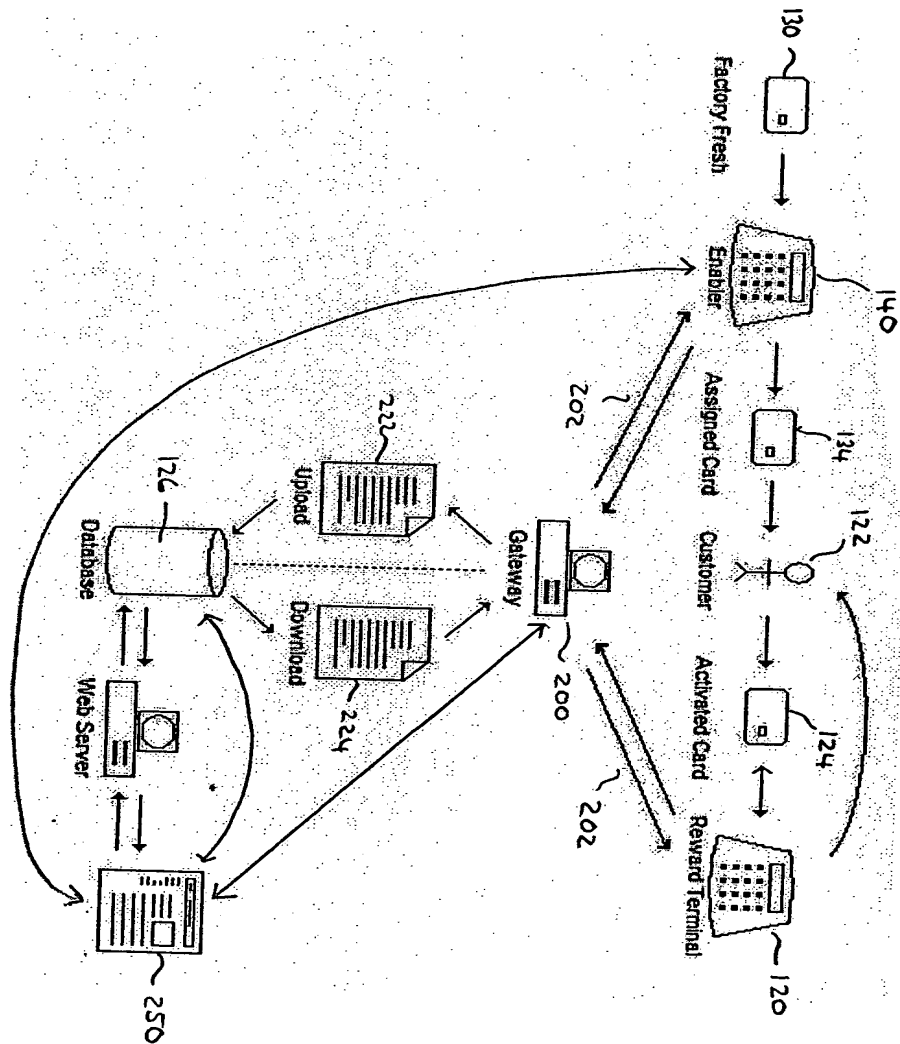


FIG. 2



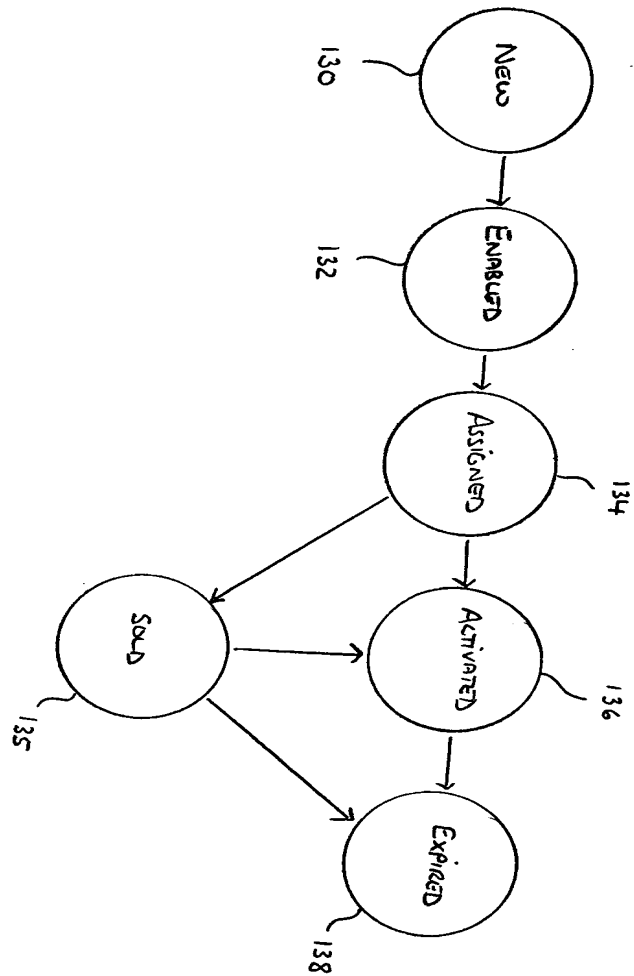


FIG. 3

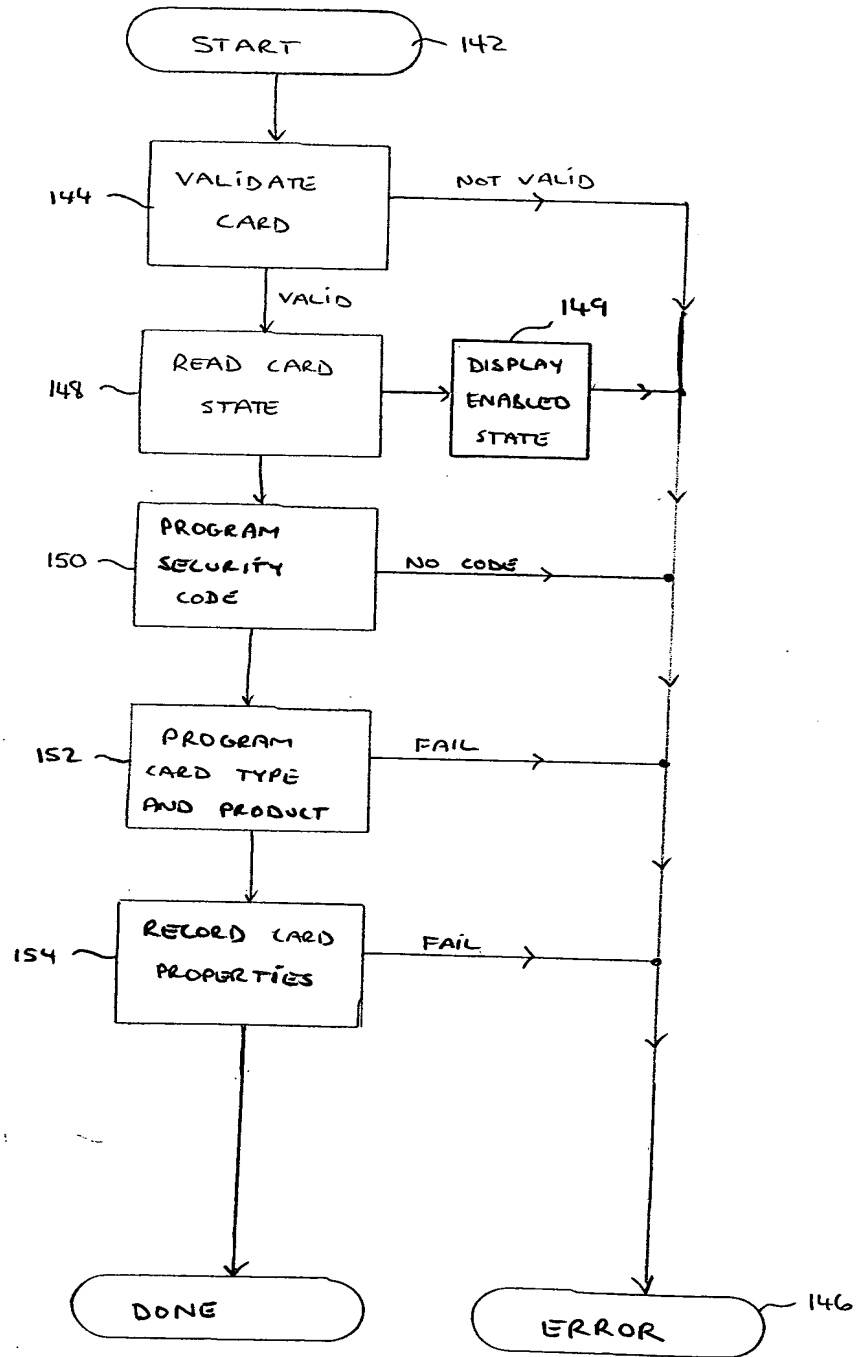


FIG. 4

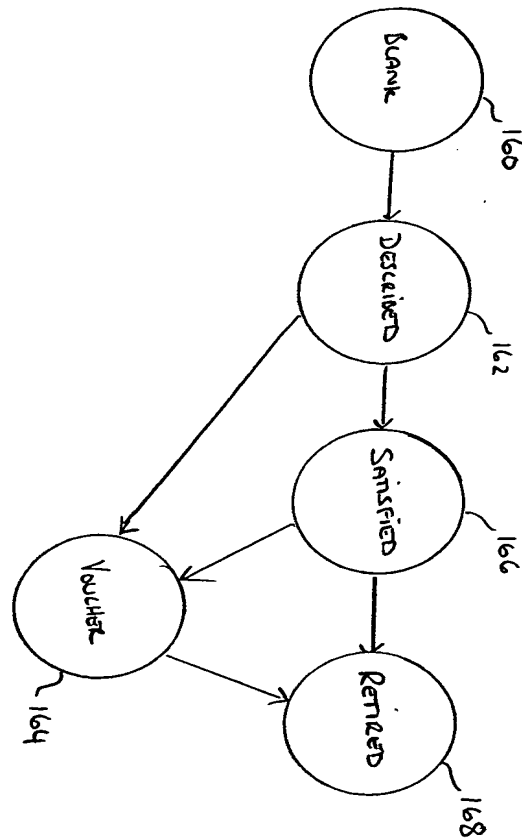


FIG. 5

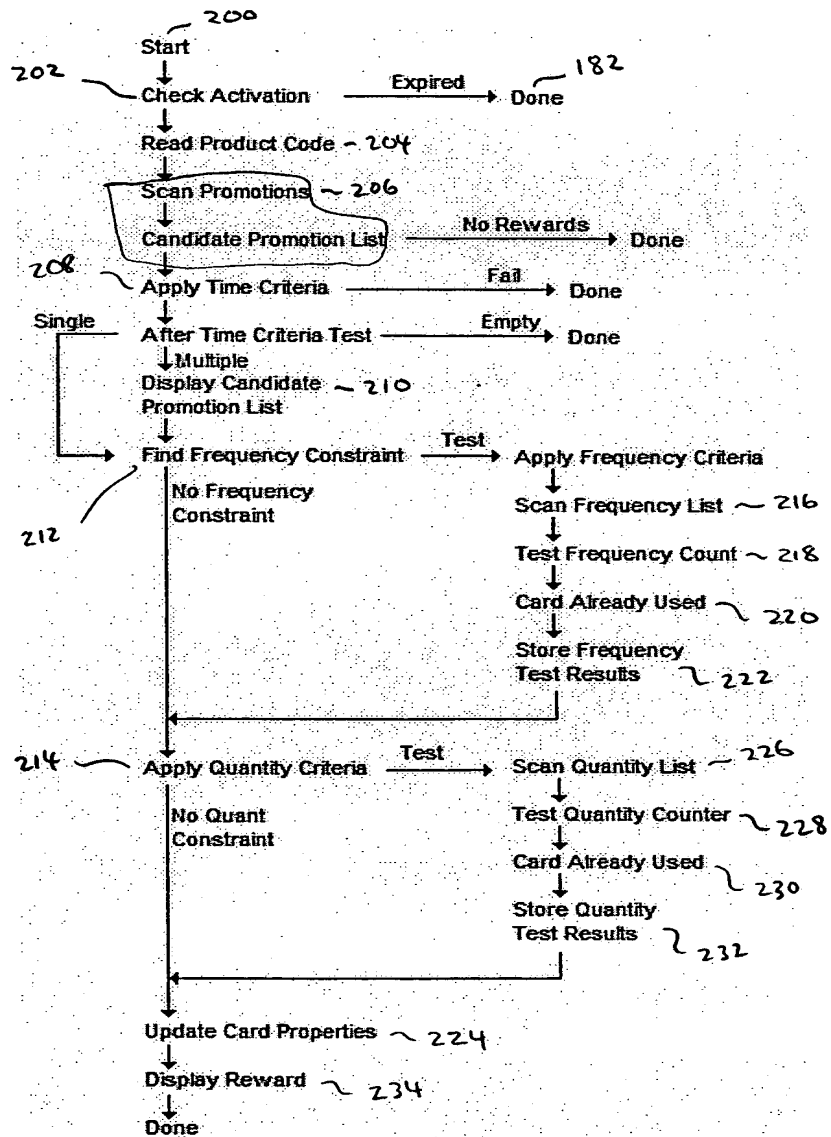


FIG. 7

PROGRAMMABLE TICKETING
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Applicant: Tyler Brooks, et al.
Docket No.: S2013-700019

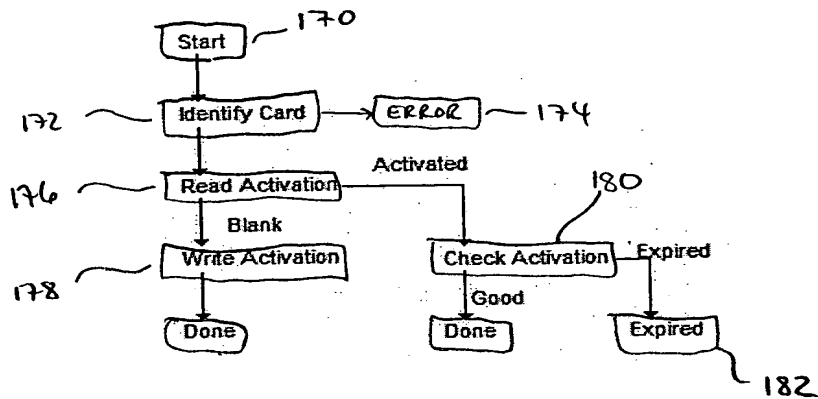


FIG. 6

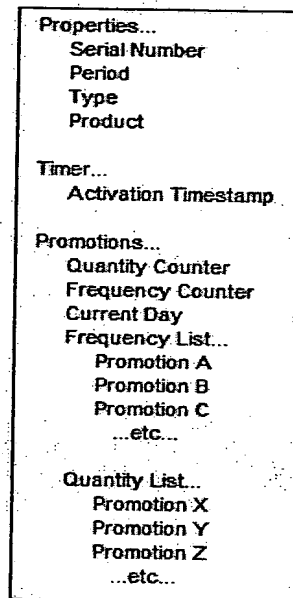


FIG. 8

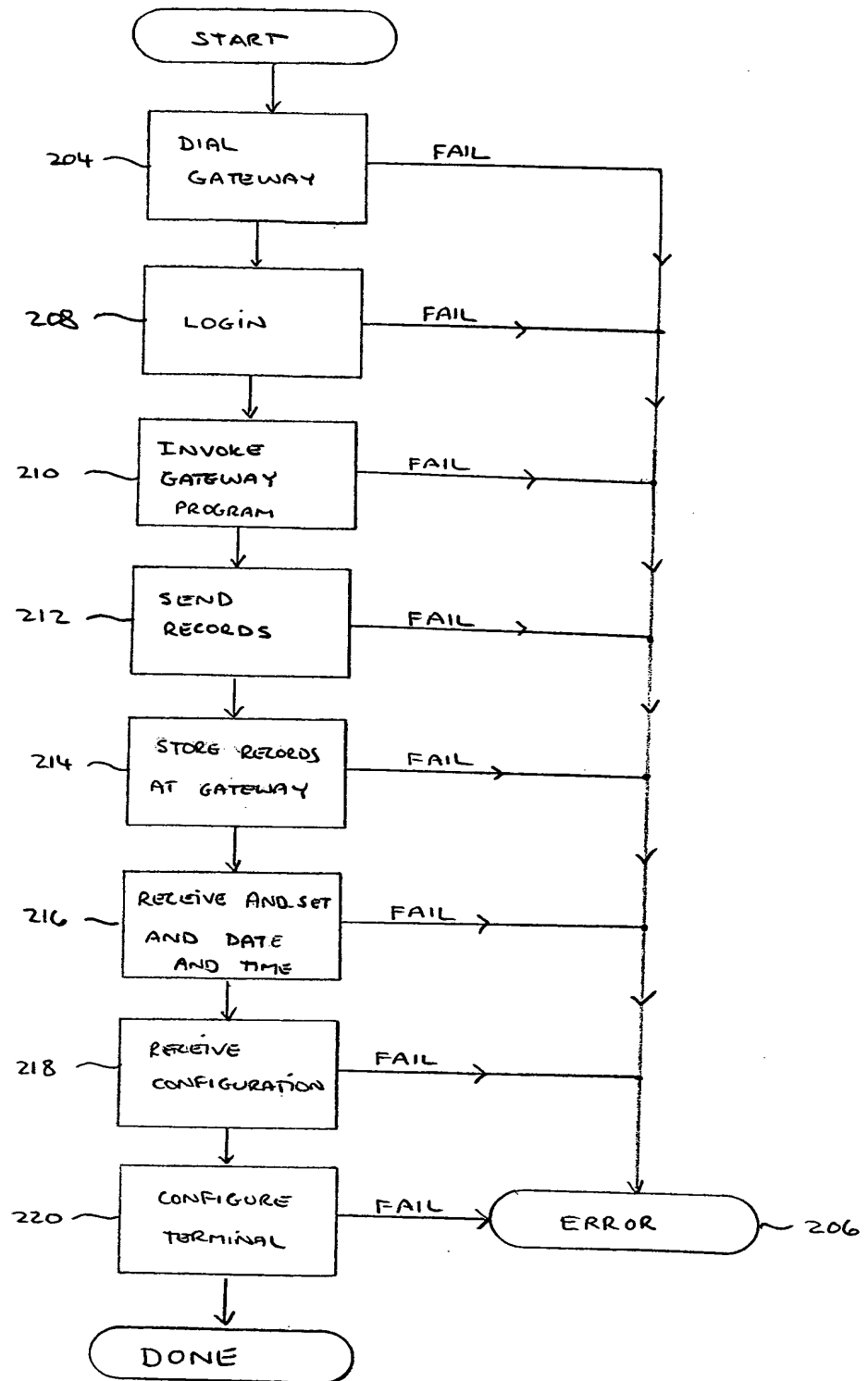


FIG. 9

PROGRAMMABLE TICKETING
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Applicant: Tyler Brooks, et al.

Docket No.: S2013-700019

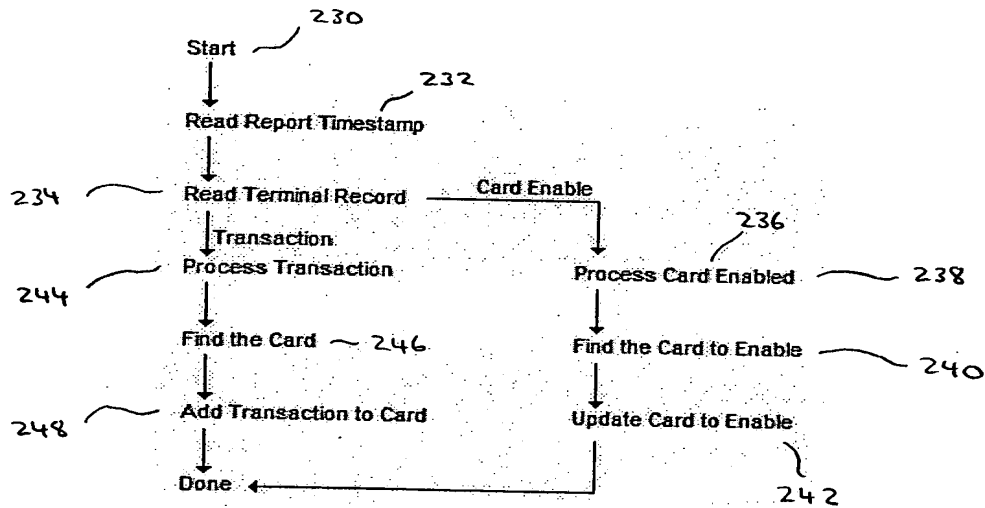


FIG. 10

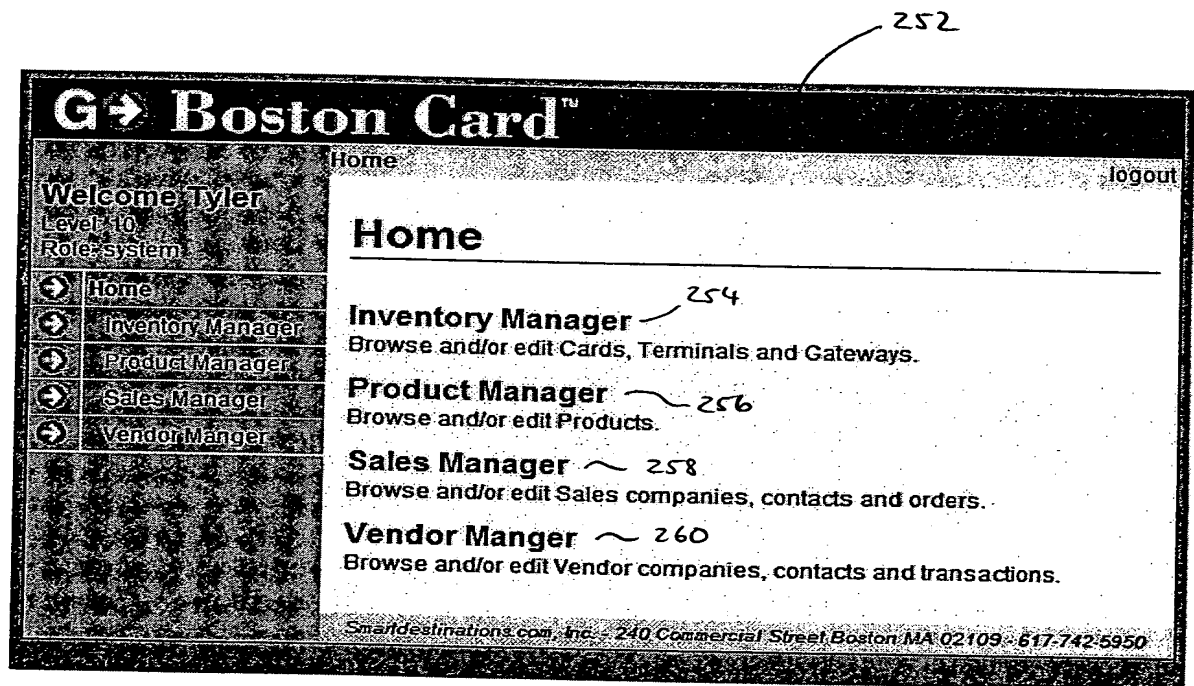


FIG. 11

Express Mail Label No.: EV 308 901 905 US

Date of Deposit: July 21, 2004

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled

PROGRAMMABLE TICKETING SYSTEM

the specification of which is attached hereto:

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

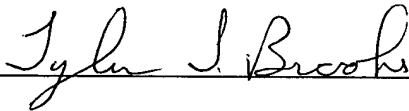
I hereby appoint the following Registered Practitioners to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

All Registered Practitioners of Lowrie, Lando & Anastasi, LLP associated with Customer Number 37462.

Address all telephone calls to Matthew B. Lowrie at telephone no. (617) 395-7003.

Address all correspondence to: the Correspondence Address associated with Customer Number 37462.

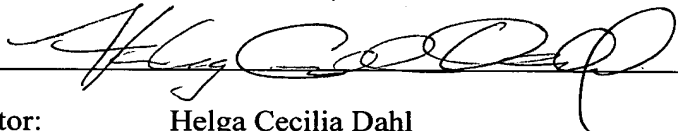
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



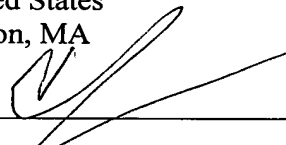
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Residence: Seattle, WA

Express Mail Label No.: EV 308 901 905 US
Date of Deposit: July 21, 2004

APPLICATION DATA SHEET

Application Information

Application Type::	Regular
Subject Matter::	Utility
Title::	PROGRAMMABLE TICKETING SYSTEM
Attorney Docket Number::	S2013-700019
Request for Early Publication?::	No
Suggested Drawing Figure::	Fig. 2
Total Drawing Sheets::	9
Small Entity?::	Yes
Petition included?::	No
Secrecy Order in Patent Appl.?::	No

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Express Mail Label No.: EV 308 901 905 US

Date of Deposit: July 21, 2004

Docket No. S2013-700019

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Tyler Brooks, et al.
Serial No: Not Yet Assigned
Confirmation No: Not Yet Assigned
Filed: July 21, 2004
For: PROGRAMMABLE TICKETING SYSTEM

Examiner: Not Yet Assigned
Art Unit: Not Yet Assigned

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

STATEMENT FILED PURSUANT TO THE DUTY OF
DISCLOSURE UNDER 37 CFR §§1.56, 1.97 AND 1.98

Sir:

Pursuant to the duty of disclosure under 37 C.F.R. §§1.56, 1.97 and 1.98, Applicants request consideration of this Information Disclosure Statement.

PART I: Compliance with 37 C.F.R. §1.97

This Information Disclosure Statement has been filed before the mailing date of a first Office Action on the merits in the above-identified case.

No fee or certification is required.

PART II: Information Cited

Applicants hereby make of record in the above-identified application the information listed on the attached form PTO-1449 (modified). The order of presentation of the references should not be construed as an indication of the importance of the references.

PART III: Remarks

Documents cited anywhere in the Information Disclosure Statement are enclosed unless otherwise indicated. It is respectfully requested that:

1. The Examiner consider completely the cited information, along with any other information, in reaching a determination concerning the patentability of the present claims;
2. The enclosed form PTO-1449 be signed by the Examiner to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application;
3. The citations for the information be printed on any patent which issues from this application.

By submitting this Information Disclosure Statement, Applicants make no representation that a search has been performed, of the extent of any search performed, or that more relevant information does not exist.

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By submitting this Information Disclosure Statement, Applicants make no representation that the information cited in the Statement is, or is considered to be, in fact, prior art as defined by 35 U.S.C. §102.

Notwithstanding any statements by Applicants, the Examiner is urged to form his own conclusion regarding the relevance of the cited information.

Serial No.: Not yet Assigned

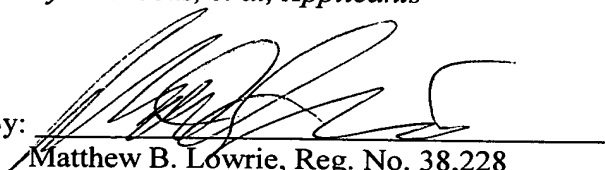
- 3 -

Art Unit: Not yet Assigned

An early and favorable action is hereby requested.

Respectfully submitted,

Tyler Brooks, et al, Applicants

By: 

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Date: July 21, 2004

FORM PTO-1449/A and B (Modified) INFORMATION DISCLOSURE STATEMENT BY APPLICANT				APPLICATION NO.: Not yet assigned		ATTY. DOCKET NO.: S2013-700019	
				FILING DATE: July 21, 2004		CONFIRMATION NO.: Not yet assigned	
				APPLICANTS: Tyler Brooks, et al.			
				GROUP ART UNIT: Not yet assigned		EXAMINER: Not yet assigned	
Sheet	1	of	1				

U.S. PATENT DOCUMENTS

Examiner's Initials	Cite No.	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication or of issue of Cited Document MM-DD-YYYY
		Number	Kind Code		
	A-1	*6,003,014		Lee, Alson A., et al.	12-14-1999
	A-2	*6,018,717		Lee, Alson, et al.	01-25-2000
	A-3	*6,216,227	B1	Goldstein, Theodore C., et al.	04-10-2001
	A-4	*2002/0112250	A1	Koplar, Edward J., et al.	08-15-2002
	A-5	*6,609,659	B2	Sehr, Richard P.	08-26-2003
	A-6	*6,609,658	B1	Sehr, Richard P.	08-26-2003
	A-7	*6,738,750	B2	Stone, Lucinda	05-18-2004
	A-8	*2004/0117250	A1	Lubow, Allen et al.	06-17-2004

FOREIGN PATENT DOCUMENTS

Examiner's Initials	Cite No.	Foreign Patent Document			Name of Patentee or Applicant of Cited Document (not necessary)	Date of Publication of Cited Document MM-DD-YYYY	Translation (Y/N)
		Office/Country	Number	Kind Code			
	A-9	WO	98/59324		Schlumberger Industries, S.A.	12-30-1998	
	A-10	WO	99/10824		Visa International Service Association	03-04-1999	
	A-11	EP	1 039 402	A2	Citibank N.A.	09-27-2000	
	A-12	WO	01/17262	A1	Koplar Interactive Systems Int'l. LC	03-08-2001	
	A-13	WO	01/84474	A2	CMA Business Credit Services	11-08-2001	
	A-14	WO	02-001485	A1	Smartclic Corporation	01-03-2002	
	A-15	WO	02-082386	A1	Freedom Card Limited	10-17-2002	
	A-16	WO	03/034267	A1	360 Degree Web, Inc.	04-24-2003	
	A-17	WO	03/067369	A2	Hernblad, Konrad	08-14-2003	
	A-18	WO	2004/036515	A1	Stillman, Suzanne Jaffe	04-29-2004	

EXAMINER	DATE CONSIDERED

#EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

* a copy of this reference need not be provided as the reference is a published U.S. Patent or U.S. Patent application and the present application was filed after June 30, 2003..

[NOTE - Must provide a copy of any patent, publication, other information listed, even if it was previously submitted to, or cited by, the U.S. Patent Office in an earlier application, unless the earlier application is identified by the IDS and is relied upon for an earlier filing date under 35 U.S.C. §120, and the copy was provided in the earlier application.]o

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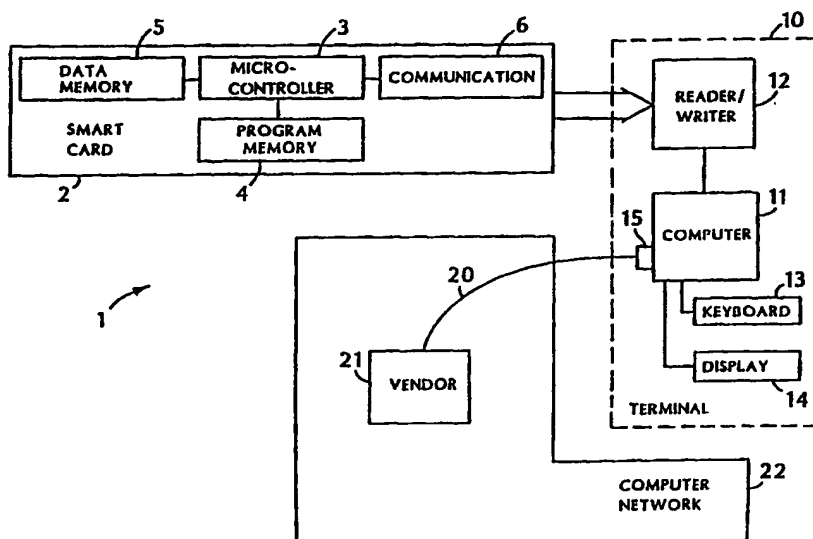
WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : G07F 7/08, 19/00		A2	(11) International Publication Number: WO 98/59324
			(43) International Publication Date: 30 December 1998 (30.12.98)
(21) International Application Number: PCT/IB98/01131		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 23 June 1998 (23.06.98)			
(30) Priority Data: 08/876,356 25 June 1997 (25.06.97) US			
(71) Applicant: SCHLUMBERGER INDUSTRIES, S.A. [FR/FR]; 50, avenue Jean-Jaurès, F-92120 Montrouge (FR).			
(72) Inventor: GUTHERY, Scott, B.; 19 Foster Road, Belmont, MA 02178-3736 (US).			
(74) Agent: AKERS, Noel, J.; Frohwitter Patent- und Recht- sanwälte, Possartstrasse 20, D-81679 München (DE).			
		Published <i>Without international search report and to be republished upon receipt of that report.</i>	

(54) Title: PERFORMING FIXED-VALUE TRANSACTIONS WITH A SMART CARD



(57) Abstract

A smart card for use with a system capable of receiving a transaction message includes a memory storing a program and data representative of one or more fixed-value units and a microcontroller configured by the program to furnish the transaction and modify the data to reduce the number of fixed-value units by a predetermined amount when the transaction is furnished. A method of performing fixed-value transactions using the smart card is also disclosed.

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PERFORMING FIXED-VALUE TRANSACTIONS WITH A SMART CARDBackground of the Invention

5 The invention relates generally to performing fixed-value transactions with a smart card.

Smart cards, also known as microprocessor cards or chip-cards, are plastic cards approximately the size of a credit card embedded with an integrated circuit (IC) chip.
10 The chip stores information while protecting it from unauthorized access.

During the past several years, smart cards have become more attractive as the price of micro-computing power and storage have continued to drop. Furthermore, it has
15 been recognized that the use of smart cards can help reduce the high overhead costs associated with transactions involving cash or credit cards. Stored-value cards, for example, lessen transaction costs by carrying monetary value directly instead of acting only as a pointer to an account.

20 Some smart cards, such as telephone-cards, are designed to allow the purchase of products or services from a specific vendor and are used directly with the vendor's equipment. Such smart cards provide a desirable marketing technique for the vendor and a convenient way for the
25 consumer to gain access to the vendor's products or services.

Summary of the Invention

In general, in one aspect, the invention features a method of performing a fixed-value transaction using a smart
30 card having stored therein initialization data including a count representing a specified number of fixed-value units. The method includes generating a transaction message in the smart card and transmitting the transaction message to a

vendor computer system. The method further includes reducing the count stored in the smart card by a predetermined amount.

5 Various implementations of the invention include one or more of the following features. The transaction message can be transmitted over a computer network. Also, the initialization data can further include a predetermined number of fixed-value units required for each smart card transaction, and the method can include reducing the count
10 stored in the smart card by the predetermined number of fixed-value units. The method can include incrementing in the smart card a count indicative of a total number of transactions generated by the smart card.

The initialization data can further include an
15 encryption key, and the transaction message can be encrypted with the encryption key. The method can also include receiving the transaction message in the vendor computer system and decrypting the transaction message with a decryption key.

20 The transaction message can include a transaction identifier indicative of goods or services associated with the transaction. The smart card can generate the transaction identifier based on parameters stored in the smart card as part of the initialization data. The
25 transaction message can further include the predetermined number of fixed-value units required for each transaction. Also, the transaction message can include a smart card identifier and a count indicative of a total number of transactions generated by the smart card.

30 The transaction message can be received in the vendor computer system which can verify that the predetermined number of fixed-value units corresponds to the transaction identifier. The count indicative of the total

number of transactions for the smart card can also be verified.

In another aspect, the invention features a smart card including a memory storing a program and data
5 representative of one or more fixed-value units and a microcontroller configured by the program to furnish the transaction and modify the data to reduce the number of fixed-value units by a predetermined amount when the transaction is furnished.

10 In various implementations, the smart card includes one or more of the following features. The data stored in the memory can include a predetermined number of fixed-value units required for each smart card transaction, and the microcontroller can be configured by the program to modify
15 and reduce the number of fixed-value units according to the predetermined number stored in the memory.

The data stored in the memory can include an encryption key, and the microcontroller can be configured by the program to encrypt each transaction message generated by
20 the smart card with the encryption key.

The microcontroller also can be configured by the program to include a transaction identifier as part of each transaction message generated by the smart card. In addition, the microcontroller can be configured by the
25 program to include the predetermined number of fixed-value units as part of each transaction message generated by the smart card. Furthermore, a count, indicative of a total number of transactions generated by the smart card, can be stored in the memory. The microcontroller can also be
30 configured by the program to increment the count by one each time a transaction message is generated by the smart card. Moreover, the microcontroller can be configured by the

program to include, as part of the transaction message, the total number of transactions generated by the smart card.

5 In various implementations, a multi-parameter algorithm can be permanently stored in the memory and vendor-specific parameters can be stored in the memory. The microcontroller can be configured by the program to include a transaction identifier, based on the multi-parameter algorithm and the vendor-specific parameters, as part of each transaction message generated by the smart card.

10 In various implementations, the invention provides one or more of the following advantages. Various implementations of the invention provide a convenient, robust and tamper-proof technique for the marketing and sale of access to a particular vendor's goods or services.
15 Furthermore, the invention provides for secure, non-reputable transactions without the need for using third parties to facilitate or implement the transfer of goods or services. Moreover, the transactions can occur with relatively small transaction costs. Minimizing transaction
20 costs is particularly important with respect to micro-transactions, in which the cost of the goods or services is of the same order of magnitude as the transaction costs.

In addition, various implementations of the invention allow a smart card holder to initiate a secure
25 transaction for goods or services without requiring the smart card to interact directly with the vendor's equipment. Specifically, the smart card need not be read by a smart card reader/writer attached to the vendor's equipment. For example, the smart card can be used to initiate a
30 transaction over a general-purpose computer network.

Moreover, since the smart card is intended for fixed-value transactions with a specific vendor, only a single communication from the card to the vendor's system is

needed to conclude the transaction. The smart card provides all the information required, including an indication of the goods or services, as well as the cost. Thus, the vendor's system receives all the information needed to conclude the transaction without having to transmit any information or instructions to the smart card. Thus, for example, the vendor's system need not instruct the smart card to reduce the number of stored monetary units on the card according to the cost of the goods or services. Since the cost of the goods or services is fixed in advance, the smart card itself automatically performs this function.

The invention is particularly advantageous, for example, in the context of obtaining services for which a consumer would otherwise have to pay a high subscription price. For example, a consumer may desire access to a vendor's on-line services available over the Internet, but expect to access the on-line services only a limited number of times. Naturally, the consumer does not wish to pay the full subscription price which the vendor would otherwise charge. The invention facilitates such a transaction by allowing the consumer to purchase the opportunity to access the on-line services a limited number of times through the use of the smart card. Once the services have been accessed the predetermined number of times, the card holder can no longer access the vendor's on-line services. The invention has applications to transactions involving other goods and services as well.

Brief Description of the Drawings

FIG. 1 is an exemplary system in which the invention can be practiced.

FIG. 2 shows initialization data stored on a smart card according to the invention.

FIG. 3 is a flow chart of a method of providing a transaction using a smart card according to the invention.

FIG. 4 shows an exemplary transaction message according to the invention.

5 Description of the Preferred Embodiments

FIG. 1 shows an exemplary system 1 which includes a microprocessor card, or smart card 2, with a microcontroller 3. Software which controls the operations of the smart card 2 is stored in program memory 4 such as nonvolatile read-
10 only memory (ROM). The software includes an encryption program to encrypt data or other information using a secure data encryption technique. The software also includes a general multi-parameter algorithm for use as explained below. Data is stored in a data memory 5. The data memory
15 5 includes alterable nonvolatile memory 5, such as electrically erasable programmable read-only memory (EEPROM). The data memory 5 also includes random access memory (RAM).

The system 1 further includes a terminal 10. The
20 terminal 10 includes, for example, a personal computer 11 which is connected to a larger general-purpose computer network 22. A smart card reader or reader/writer 12 is attached and communicates with the computer 11. The terminal 10 also includes means for entering information
25 into the computer or indicating a selection, such as a keyboard 13, as well as a display screen 14. A mouse or a vocal input device (not shown) can be used in addition to or in place of the keyboard 13.

The computer 11 can transmit and receive information
30 to and from other entities in the network 22, for example, via a modem 15 and communication lines 20. As shown in FIG. 1, the network 22 includes one or more vendor computer

systems, such as the vendor computer system 21, which offer goods or services to customers who have access to the network 22. The computer system 21 can be, for example, a server.

5 The smart card 2 also has a device for communicating
6 with the smart card reader or reader/writer 12. In
certain implementations, the device for communicating 6 is
electrical circuitry which requires physical contact with
pins in the smart card reader/writer 12. Alternatively,
10 electrical circuitry on the smart card 2 can use inductive
coupling, capacitive coupling or radio signals to
communicate with the reader/writer 12. Communication may be
performed by a local area or wide area network, for example,
by way of the Internet or by a satellite communication link.

15 In various implementations, the smart card 2 is
issued by a particular vendor associated with the vendor
computer system 21 and is intended to be used to purchase
goods or services from that particular vendor. The smart
card 2 is also intended to be used in fixed-value
20 transactions. In other words, each transaction generated by
the smart card 2 has the same predetermined monetary value
and requires a previously established number of fixed-value
monetary units.

 As shown in FIG. 2, when the smart card 2 is
25 purchased from the vendor, the smart card is initialized by
the vendor with certain initialization data. This
initialization data is stored securely in the data memory 5
to prevent its being tampered with by the purchaser or some
other third party. The initialization data includes a
30 unique smart card identifier which can represent, for
example, a combination of alphanumeric characters. The
initialization data further includes the encryption key of
the vendor. A count corresponding to the number of fixed-

value monetary units is also stored on the card in the data memory 5. During initialization of the smart card 2, the vendor sets this count equal to the number of fixed-value monetary units purchased by the consumer. Alternatively, the number of fixed-value monetary units can be stored in hardware, such as a counter. In addition, a predetermined number representing the number of fixed-value units required for each smart card transaction is stored in the data memory 5.

10 The vendor also initializes the smart card 2 by storing specific parameters to be used in conjunction with the general multi-parameter algorithm stored in the program memory 4. The general multi-parameter algorithm allows each vendor to select parameters which are tailored to its application and security requirements. The parameters are stored in the data memory 5. The microcontroller 3 on the smart card 2 uses the multi-parameter algorithm to generate a transaction identifier which can be used, as discussed above, to identify the particular products or services for which the smart card 2 was issued.

Finally, the initialization data includes a count of the total number of transactions generated by the smart card 2 from the time the smart card is issued until the present. This count is initially set by the vendor to zero.

25 FIG. 3 is a flow chart illustrating the operation and use of the smart card 2. For purposes of illustration, it is assumed that the vendor is the provider of certain on-line services available to the consumer through the personal computer 11 attached to the network 22. As indicated by 30, a person purchases the smart card 2 which is initialized by the vendor as explained above. When the card holder wishes to gain access to the vendor's on-line services for which the smart card was issued, the card holder accesses an

appropriate program over the computer network and inserts the smart card 2 into the card reader 12, as indicated by 31. The computer 11 prompts the card holder to indicate whether he wishes to access the vendor's on-line services, for example, by pressing a particular key on the keyboard 13. If the card holder makes the appropriate selection, as indicated by 32, then the computer 11 instructs the smart card 2 to generate an encrypted transaction message corresponding to the selected goods or services from the appropriate vendor. The smart card 2 determines whether there are a sufficient number of fixed-value monetary units remaining on the card to allow the transaction, as indicated by 33. If there are a sufficient number of units, then the smart card 2 generates the encrypted transaction message, as indicated by 34. If a sufficient number of monetary units do not remain, then the smart card 2 does not generate the transaction message, as indicated by 35. In this case, a message may appear on the user's display screen 14 indicating that the transaction cannot be performed because there are an insufficient number of monetary units.

An exemplary transaction message is illustrated in FIG. 4. The transaction message includes the unique smart card identifier and the number of fixed-value units represented by the transaction. In addition, the transaction identifier, which is generated by the smart card 2 and is based on the multi-parameter algorithm and the parameters entered by the vendor, is included in the transaction message. The transaction identifier can be, for example, a sequence of numbers. The transaction message further includes the number of fixed-value units remaining after the transaction. Finally, the total number of transactions generated by the smart card 2 is included as part of the transaction message. The transaction message is

encrypted by the smart card 2 using the vendor's encryption key which, as previously explained, is stored in the data memory 5.

The computer 11 then sends a request for the
5 vendor's goods or services together with the encrypted transaction message over the network, as indicated by 36. As indicated by 38, the smart card 2 is programmed to reduce automatically the count corresponding to the number of
10 fixed-value monetary units by the number of fixed-value monetary units represented by the transaction. Thus, the count of fixed-value monetary units reflects the current number of fixed-value monetary units remaining on the smart card 2. The smart card 2 is also programmed to increase the
15 count of the total number of transaction generated by the card by one, as indicated by 40.

As indicated by 42, the request for the vendor's goods or services and the encrypted transaction message are received by the vendor's computer system 21. The vendor's computer system 21 decrypts the transaction message using
20 the vendor's decryption key, as indicated by 44 (FIG. 3B). The computer system 21 then verifies the transaction identifier and the number of fixed-value units, as indicated by 46, to confirm that the transaction identifier is valid and that the number of fixed-value units corresponds to the
25 transaction identifier and to the goods or services purchased. If the data received in the transaction message is verified, then the vendor delivers the goods or services, as indicated by 48. In the present example, the card holder would be permitted access to the vendor's on-line services
30 by using the computer 11. If the data received in the transaction message is not verified, then the goods or services are not delivered, as indicated by 50. Moreover,

subsequent requests for goods or services associated with the particular smart card identifier can be denied.

5 In certain implementations, any or all of the following additional verification checks can be performed, in either real-time or off-line depending on the security requirements of the system. As indicated by 52, the vendor's computer system 21 can verify whether the smart card identifier received in the transaction message is valid, whether the current count of transactions associated
10 with the card identifier is correct, or whether the transaction identifier and the number of transactions generated by the smart card correlate correctly. If one or more of the verification checks fails, subsequent transaction requests associated with the smart card
15 identifier can be rejected, as indicated by 54.

Once the fixed-value monetary units on the smart card 2 are depleted or are insufficient to allow further transactions for the goods or services for which it was issued, the card-holder can either dispose of the card 2 or
20 return it to the vendor for re-initialization and the purchase of additional monetary units.

Although the invention has been described above with reference to a smart card 2 containing initialization data corresponding to a single vendor and a count corresponding
25 to monetary units for a single type of goods or services, it should be understood that, in some implementations of the invention, the smart card 2 can be used with multiple types of transactions, each of which corresponds to a different predetermined monetary value and which requires a
30 corresponding reduction in the number of predetermined fixed-value units on the smart card. The smart card would include a separate count corresponding to each type of goods or services. Furthermore, in such implementations,

initialization data from more than one vendor can be stored on the smart card 2 in a secure manner. For this purpose, the smart card can include an index of identifiers corresponding to the vendors and the products available from each vendor. Once the smart card 2 is inserted into the reader/writer 12 and an appropriate program on the computer 11 is accessed by the user, the computer 11 prompts the card holder to make a selection using, for example, the keyboard 13. The selection indicates the particular transaction which the card holder wishes to initiate with the smart card 2. Once the card holder makes a selection, the computer 11 instructs the smart card 2 to generate an encrypted transaction message based upon the initialization data corresponding to the selected goods or services from the appropriate vendor. The transaction message would then be transmitted to the appropriate vendor's computer system, as discussed above. Additionally, the particular count which resides in the smart card and which corresponds to the selected goods or services would be reduced in the manner discussed above.

Other implementations are contemplated within the scope of the following claims.

What is claimed is:

1. A method of performing a fixed-value transaction using a smart card having stored therein initialization data comprising a count representing a specified number of fixed-value units, the method comprising:
 - generating a transaction message in the smart card;
 - transmitting the transaction message to a vendor computer system; and
 - reducing the count stored in the smart card by a predetermined amount.
2. The method of claim 1 wherein the transmitting comprises transmitting the transaction message over a computer network.
3. The method of claim 1 wherein the initialization data further comprises a predetermined number of fixed-value units required for each smart card transaction, and wherein the reducing comprises reducing the count stored in the smart card by the predetermined number of fixed-value units.
4. The method of claim 1 wherein the initialization data further comprises an encryption key, and generating a transaction message comprises encrypting the transaction message with the encryption key.
5. The method of claim 4 further comprising receiving the transaction message in the vendor computer system and decrypting the transaction message with a decryption key.

6. The method of claim 1 wherein the transaction message comprises a transaction identifier indicative of goods or services associated with the transaction.

5 7. The method of claim 6 further comprising generating in the smart card a transaction identifier based on parameters stored in the smart card as part of the initialization data.

10 8. The method of claim 6 wherein the initialization data further comprises a predetermined number of fixed-value units required for each smart card transaction, and wherein the transaction message further comprises the predetermined number of fixed-value units required for each smart card transaction.

15 9. The method of claim 8 further comprising receiving the transaction message in the vendor computer system and verifying in the vendor computer system that the predetermined number of fixed-value units required for each smart card transaction corresponds to the transaction
20 identifier.

10. The method of claim 1 wherein the transaction message further comprises a smart card identifier and a count indicative of a total number of transactions generated by the smart card.

25 11. The method of claim 10 further comprising receiving the transaction message in the vendor computer system and verifying in the vendor computer system that the

count indicative of the total number of transactions for the smart card is correct.

12. The method of claim 1 further comprising incrementing in the smart card a count indicative of a total
5 number of transactions generated by the smart card.

13. A smart card for use with a system capable of receiving a transaction message, comprising:
a memory storing a program and data representative of one or more fixed-value units; and
10 a microcontroller configured by the program to furnish the transaction and modify the data to reduce the number of fixed-value units by a predetermined amount when the transaction is furnished.

14. The smart card of claim 13 wherein the
15 data stored in said memory includes a predetermined number of fixed-value units required for each smart card transaction, and wherein the microcontroller is configured by the program to modify and reduce the number of fixed-value units according to the predetermined number stored in
20 the memory.

15. The smart card of claim 13 wherein the data stored in the memory further comprises an encryption key, and wherein the microcontroller is further configured by the program to encrypt each transaction message generated
25 by the smart card with the encryption key.

16. The smart card of claim 13 wherein the microcontroller is further configured by the program to

include a transaction identifier as part of each transaction message generated by the smart card.

17. The smart card of claim 13 wherein a multi-parameter algorithm is permanently stored in the memory, vendor-specific parameters are stored in the memory, and the microcontroller is configured by the program to include a transaction identifier, based on the multi-parameter algorithm and the vendor-specific parameters, as part of each transaction message generated by the smart card.

18. The smart card of claim 14 wherein the microcontroller is configured by the program to include the predetermined number of fixed-value units as part of each transaction message generated by the smart card.

19. The smart card of claim 13 wherein a count, indicative of a total number of transactions generated by the smart card, is stored in the memory.

20. The smart card of claim 19 wherein the microcontroller is further configured by the program to increment by one the count, indicative of the total number of transactions, each time a transaction message is generated by the smart card.

21. The smart card of claim 21 wherein the microcontroller is further configured by the program to include, as part of the transaction message, the total number of transactions generated by the smart card.

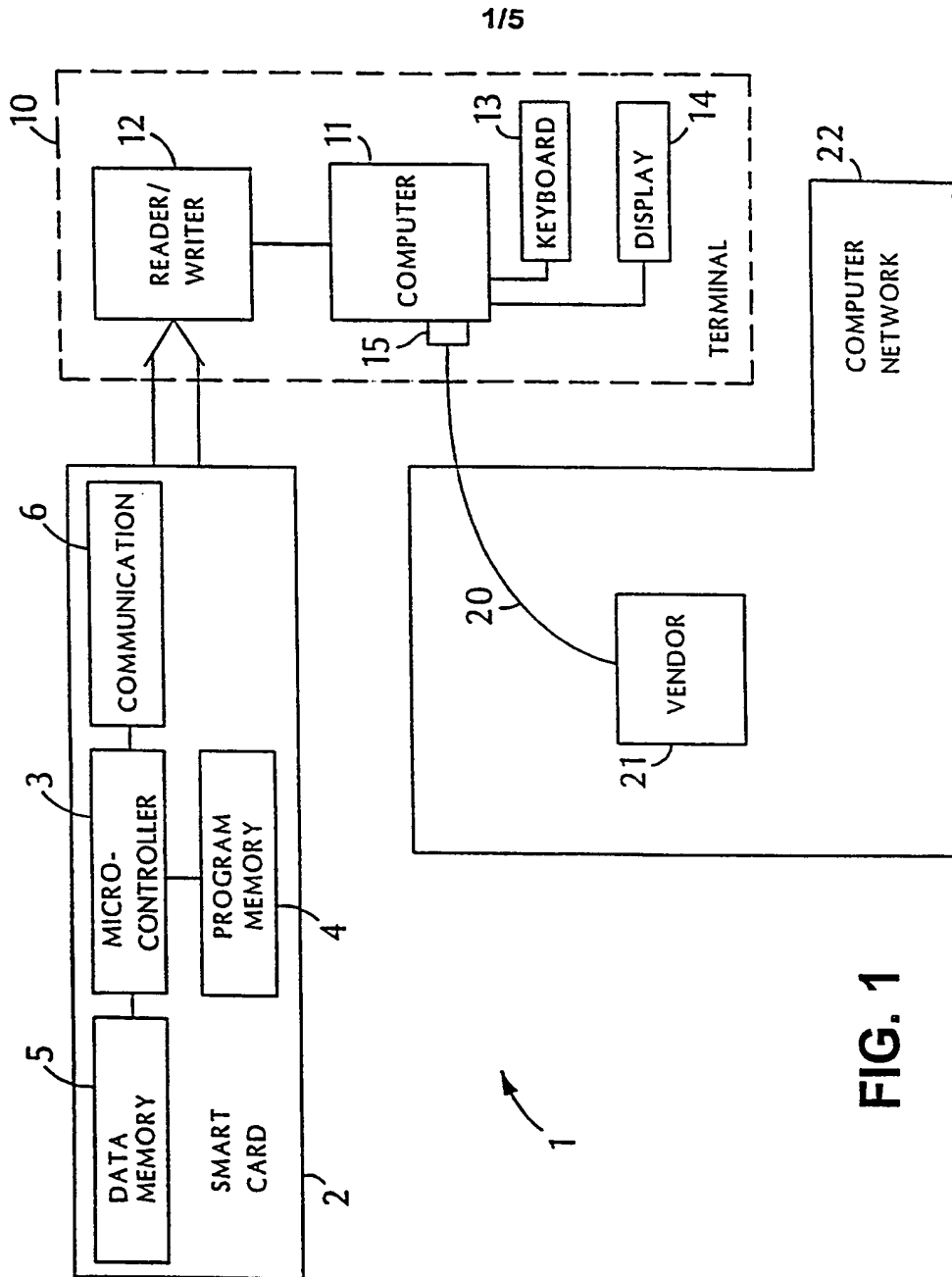
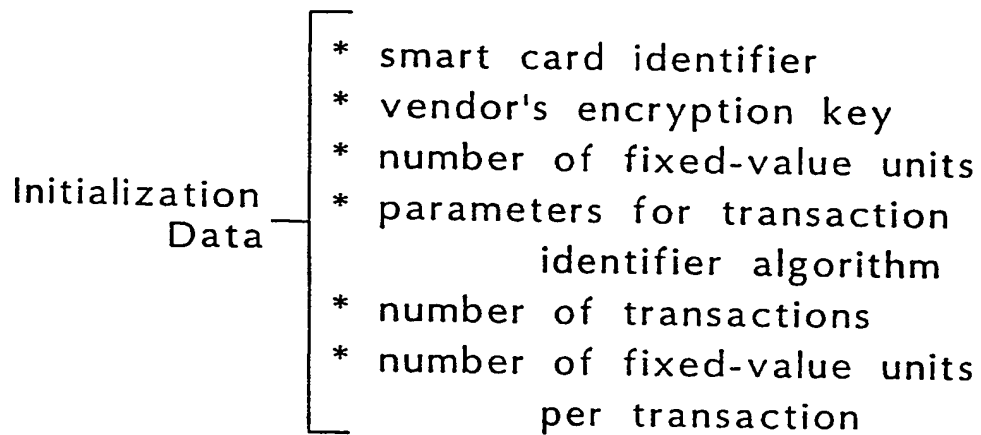
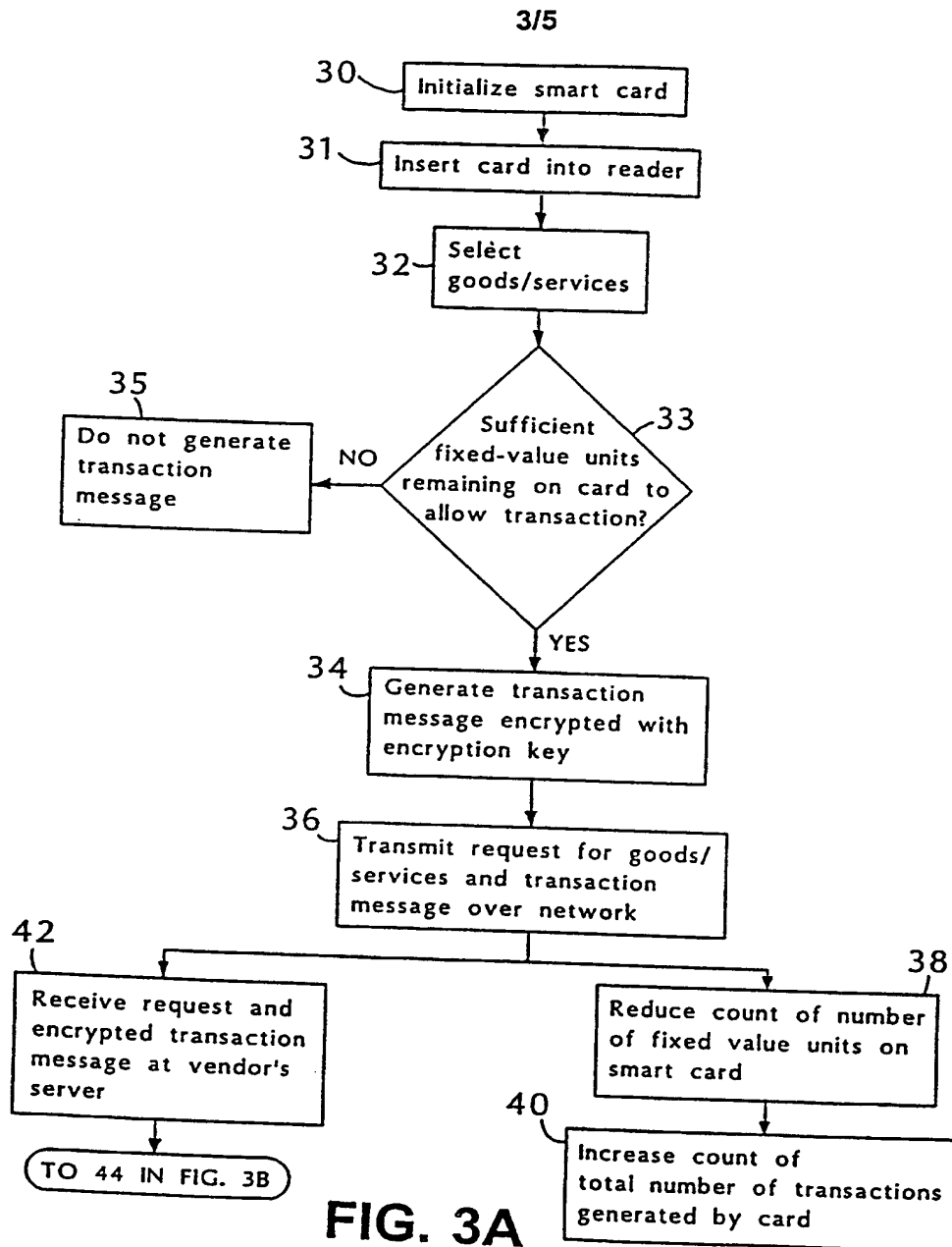


FIG. 1

2/5

**FIG. 2**



4/5

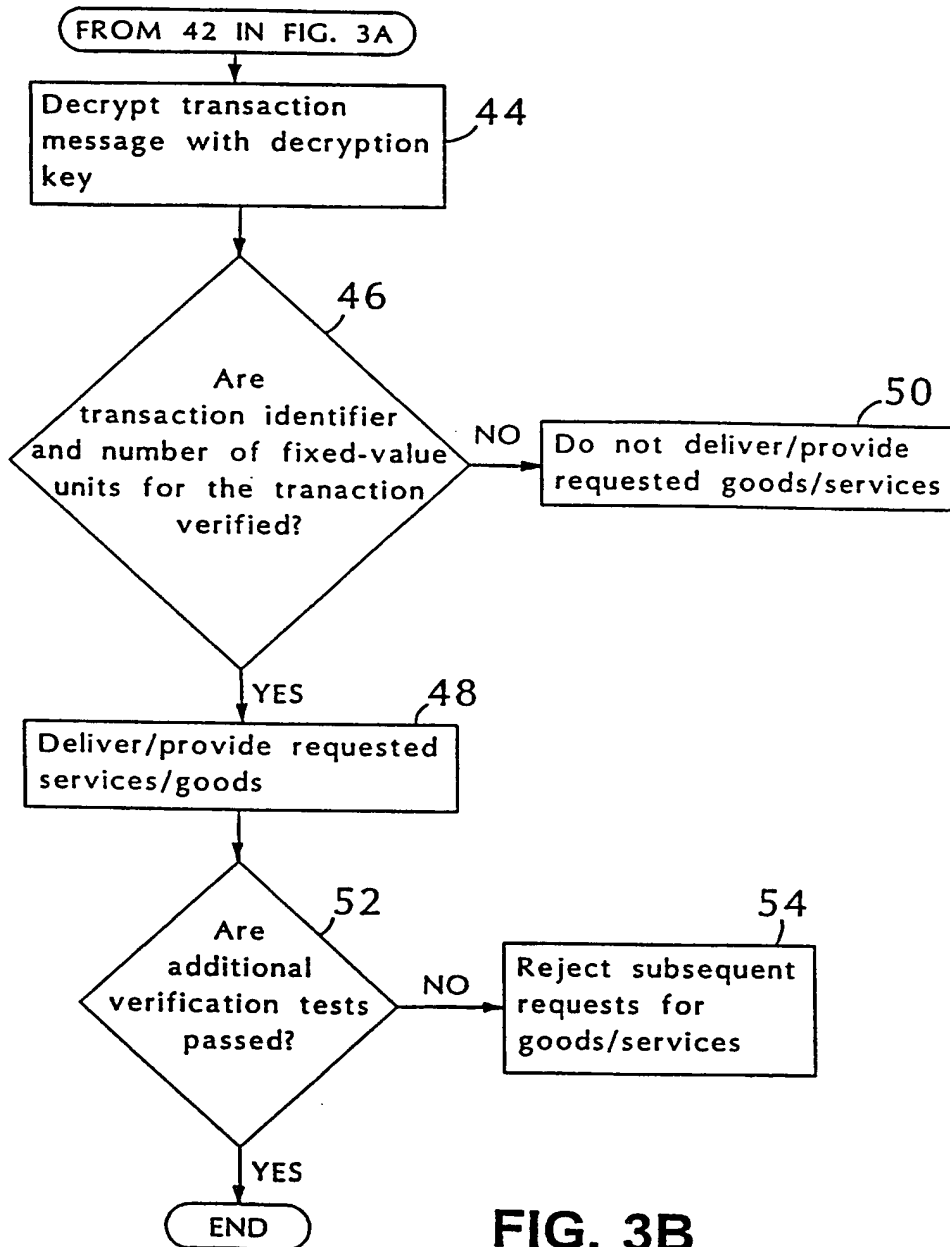


FIG. 3B

5/5

Transaction message

Smart card identifier	Number of fixed-value units for current transaction	Transaction identifier	Number of fixed-value units remaining	Total number of transactions generated by smart card

FIG. 4

PCT

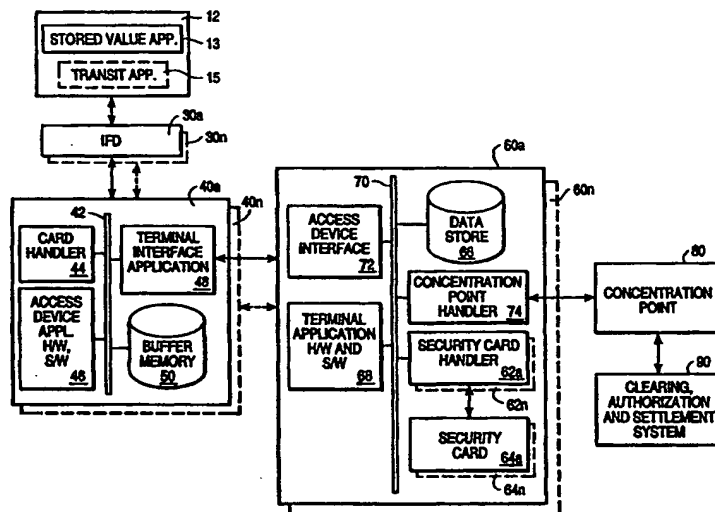
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : G06F 17/60, 7/08		A1	(11) International Publication Number: WO 99/10824
			(43) International Publication Date: 4 March 1999 (04.03.99)
(21) International Application Number: PCT/US98/17352 (22) International Filing Date: 21 August 1998 (21.08.98) (30) Priority Data: 08/918,559 22 August 1997 (22.08.97) US (71) Applicant (for all designated States except US): VISA INTERNATIONAL SERVICE ASSOCIATION [US/US]; 900 Metro Center Boulevard, MS M1-11A, Foster City, CA 94404 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): LEE, Alson [US/US]; 1320 North Plum Grove Road, Schaumburg, IL 60173 (US). SLOAN, Jerry, F. [US/US]; 19968 Charters Avenue, Saratoga, CA 95070 (US). WENTZIEN, Irwin, H. [US/US]; 19801 Merri Brook Court, Saratoga, CA 95070 (US). (74) Agent: MASCHOFF, Kurt, M.; Visa International Service Association, 900 Metro Center Boulevard, MS M1-11A, Foster City, CA 94404 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	

(54) Title: SYSTEM AND METHOD FOR FAST SMART CARD TRANSACTIONS



(57) Abstract

A method for using a smart card to gain access through an access device upon payment of a value (V) is performed by first operatively coupling the card to the access device. The access device reads a first and a second set of data from the card, and performs a first authentication process on the first set of data. Access is permitted if the first authentication process meets a required condition. Access is denied otherwise. If access is permitted, the second set of data is stored in the access device for further processing, including a second authentication process which operates on the first and second sets of data.

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SYSTEM AND METHOD FOR FAST SMART CARD TRANSACTIONS

BACKGROUND OF THE INVENTION

The present invention relates generally to payment systems. More particularly, embodiments of the invention relate to payment systems using smart cards.

Portable transaction cards with processing power, or so-called "smart cards" are being developed in the size of conventional plastic credit cards. These smart cards can include an embedded computer chip having processing power and memory. Variants of these cards were described in the early 1970s by, for example, Moreno in U.S. Patent No. 4,007,355. However, the cards are only recently becoming widely available for payment applications around the world.

The International Standards Organization (ISO) has established a number of specifications for such electronic cards under, for example, the ISO/IEC Standards Series 7810, 7811, 7816, 10536 and 14443. A typical smart card includes a plurality of spaced apart electrical contacts on one surface which provide input and output interfaces with the computer processor and memory in the card. Cards compliant with ISO/IEC Standard 7816-series have contacts which interface with a terminal via ohmic contact ("contact"-type cards). Cards compliant with, e.g., ISO/IEC Standard 10536-series or 14443-series rely on close, or remote-coupling with a terminal (hereinafter generally referred to as "contactless" -type cards). Some smart cards are now being produced with both types of contact schemes, i.e., they are compatible with terminals having contact interfaces or contactless interfaces. These types of cards are sometimes referred to as combination cards.

A block diagram of a smart card 12 is shown in Fig. 1. Smart card 12 can be implemented as a processor card as illustrated in Fig. 1. Of

course, smart card 12 can be implemented in a variety of different ways, and the card of Fig. 1 is intended to illustrate one existing version of card that may be used with the present invention. Smart card 12 has an embedded microcontroller with a microprocessor 14, card memory including random access memory (RAM) 16, read-only memory (ROM) 18, non-volatile memory 20, an encryption module 24, a card reader interface 22, and first and second contact structures 26, 28. Other features of the microcontroller may be present but are not shown, such as a clock, a random number generator, interrupt control, control logic, a charge pump, power connections, and the like.

Microprocessor 14 is any suitable central processing unit for executing commands and controlling the device. RAM 16 serves as storage for calculated results and as a stack memory. ROM 18 stores the operating system, fixed data, standard routines, and look-up tables. Non-volatile memory 20 (such as EPROM or EEPROM) serves to store information that must not be lost when the card is connected to a power source but that must also be alterable to accommodate data specific to individual cards or any changes possible over the card lifetime. This information might include a card identification number, a personal identification number, authorization levels, cash balances, credit limits, etc. Encryption module 24 is an optional hardware module used for performing a variety of encryption algorithms. Card reader interface 22 includes the software and hardware necessary for communication with the outside world. In the smart card shown, two different contact structures are provided on the card, a first contact structure 26 which may be e.g., a ISO/IEC Std. 7816-series style contact, and a second contact structure 28 which may be, e.g., an ISO/IEC Std. 10536-series or 14443-series style contactless or close-coupled interface. Other types of contact schemes may also be possible, including remote-coupled, etc.

One application for smart cards such as smart card 12 of Fig. 1, is as an electronic purse or "stored value card". In this type of application, a prepaid amount of value or representation of currency is stored in the smart card memory for use in the place of conventional cash.

5 The source of the value stored in a card may be, for example, a bank account, a credit card, a debit card, another electronic card, currency, or other sources of funds. In operation, the stored value card is inserted into a terminal device which communicates with the card through the contacts (e.g., via ohmic or close-coupling, depending upon the type of interface

10 supported).

The terminal device may be, e.g., incorporated into a vending machine, cash register, or other point-of-sale device. Value equal to the amount of the purchase is passed from the consumer's card to the merchant terminal or to a central clearing and authorization system so

15 the merchant or vendor may be credited with the appropriate amount of value. Correspondingly, the amount of available currency in the consumer's card is reduced by the amount of the purchase. These stored value applications are becoming more widely used in the U.S. and throughout the world. Currently, the primary applications in which

20 stored value cards are used include purchases at vending machines, telephones, gasoline pumps, and other point of sale devices in which the goods or services purchased are low dollar value items. Other types of stored value systems use a token-type approach to value. For example, when a consumer's card is loaded with value, the consumer can pass that

25 value to another consumer's card or to a merchant's card. The recipient of the value, or the token, can then use the value without needing to redeem the value by going through a bank clearing and settlement process. For the purposes of this disclosure, a stored value system will be described which uses a clearing and settlement function. However, those skilled in

the art will recognize that techniques and features of the invention may be implemented in other types of stored value systems as well.

5 Stored value card systems are operated as both "open" or "closed" systems. "Closed" systems are limited to specific participating merchants. For example, some universities offer stored value cards to their students for use in university cafeterias and book stores. The cards are not compatible with point of sale devices or terminals outside the university. These "closed" systems are easier to implement from a technical and security perspective because of this closed universe of uses.

10 "Open" systems, on the other hand, allow use of the card at substantially any merchant who has a compatible point of sale device or card reader. An example of such a system is the Visa Cash® system offered by Visa International Service Association of San Francisco California. In many respects, "open" stored value card systems are preferable to "closed"

15 systems, as they allow the cards to be used in a wide variety of places, for various types of purchases. "Open" systems, however, are more difficult to implement and have more rigorous security requirements.

As these stored value card systems become more widely available, it is desirable that they be capable of use in more payment

20 applications. For example, a solution for using stored value cards in making payments over open networks such as the internet is described in commonly-assigned U.S. Patent Application Serial No. 08/951,614, entitled "Internet Payment System Using Stored Value Cards", filed on October 16, 1997, which is incorporated herein by reference for all

25 purposes.

It would also be desirable to use smart cards in transit or access applications, such as toll booths, parking meters, etc. Public transit systems are widely used in most large communities. These systems are relied upon to efficiently transport large numbers of people.

To transport large numbers of people, especially at peak traffic times, it is necessary that passengers be able to enter and exit the transit system quickly in an even flow. Existing transit systems use a variety of payment and authorization methods to make sure passengers can quickly board and disembark. For example, many buses, subways, and trains allow passengers to use currency, tokens or passes to pay for their ride. The objective is to verify a passenger has paid or has a valid pass as quickly as possible to ensure the greatest possible throughput, especially at peak use times. Turnstiles and other access devices are used to permit or deny access depending upon proper verification of a rider's payment. It would be desirable to permit transit passengers to gain access to transportation using smart cards. Further, it is desirable to implement such an access system using an "open" stored value card system (i.e., a system which is not limited to a closed universe of merchants or suppliers).

Unfortunately, however, existing smart cards and "open" stored value card systems are too slow for acceptable use in most transit systems. The security and authentication processes needed to verify a transaction using existing systems typically takes over 1.0 to 2.0 seconds. This is too long of a wait for, e.g., transit riders trying to gain entry to a transit system at rush hour. It would be desirable to implement an "open" stored value system with a quicker access and authorization time, without compromising the ability to perform full authentication and verification of cards.

Accordingly, a system and method for fast smart card transactions is described.

SUMMARY OF THE INVENTION

Embodiments of the present invention provide a smart card system suited for applications where cardholders demand a very fast

transaction approval and response time and where large numbers of transactions are presented for authorization. In one specific embodiment, a cardholder presents a smart card to an interface device coupled to an access device. First and second sets of information are read from the card.

- 5 The access device performs a "first phase" of the transaction, including, e.g., low-level authentication of the card using first data read from the card. If the first phase of the transaction is successful, access is granted.

- A subsequent, or "second phase" of the transaction process may then be performed in the background between the access device and
10 a terminal device. This second phase of the transaction can be performed in a batch on a predetermined time schedule. The first phase of the transaction may include verifying the card has sufficient funds available to make the requested access, or may simply verify the card has not yet expired. The second phase of the transaction generally includes steps to
15 authenticate that the card was validly issued and that a valid card was involved. In one embodiment, the second phase of the transaction includes performing public key encryption. In another embodiment of the present invention, a fast smart card transaction may be performed using symmetric encryption techniques. Portions of the first and second phases
20 of the transaction may include the use of symmetric encryption and decryption techniques.

- In one embodiment of the present invention, the access device is a turnstile such as, for example, an admission turnstile at a light rail station, etc. The terminal device may be a terminal located near the
25 access device, and may be configured to service a number of access devices on a regular basis.

The result is an access system suited for applications where a large number of cardholders need quick authorization response times. Embodiments of the invention can be used in applications requiring

access times of less than about 0.25 to 0.50 seconds. From the cardholder's perspective, systems implemented according to the invention process and approve the transaction almost instantly. Systems implemented using features of the invention allow the use of "open" stored value card system applications in transit or access applications, giving cardholders the ability to use a single card for purchases at point of sale devices and transit applications.

A further understanding of the nature and advantages of the invention may be realized by reference to the remaining portions of the specification and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a smart card;

Fig. 2 is a block diagram of a smart card system incorporating features of an embodiment of the present invention;

Fig. 3 is a flow diagram depicting a first phase of a transaction process according to an embodiment of the present invention;

Fig. 4 is a flow diagram depicting a second phase of a transaction process according to an embodiment of the present invention;

Fig. 5 is a flow diagram depicting a first phase of a transaction process according to a further embodiment of the present invention;

Fig. 6 is a flow diagram depicting a second phase of a transaction process according to a further embodiment of the present invention;

Fig. 7 is a flow diagram depicting a first phase of a transaction process according to a further embodiment of the present invention;

5 Fig. 8 is a flow diagram depicting a second phase of a transaction process according to a further embodiment of the present invention; and

Fig. 9 is a flow diagram depicting a general process flow according to embodiments of the present invention.

DESCRIPTION OF SPECIFIC EMBODIMENT(S)

10 Embodiments of the present invention permit existing stored value card applications to be used in environments, such as transit or access control, which require fast authorization response times.

15 Embodiments of the present invention will now be described by referring first to Fig. 2, where a specific implementation of a stored value card system 10 is shown. Stored value card system 10 includes a consumer card 12, an interface device 30, an access device 40, a terminal 60, a concentration point 80, and a clearing, authorization, and settlement system 90.

20 Consumer card 12 is a smart card such as the card shown in Fig. 1. For the purposes of describing embodiments of the invention, consumer card 12 has at least a stored value application program 13 stored in card memory, e.g., in ROM 18. Additionally, consumer card 12 may have a transit application program 15 stored in memory which, although a separate application, may run in conjunction with stored value
25 application program 13. Other application programs may also be stored in memory of consumer card 12, such as credit/debit applications, loyalty

programs, health card information programs, licensing programs, or the like.

For the purposes of describing the invention, consumer card 12, access device 40 and terminal 60 will be described as passing commands in a "command-response" format, as set forth in, e.g., "EMV '96 Integrated Circuit Card Specification for Payment Systems", Version 3.0, June 30, 1996, published jointly by Europay, MasterCard, and Visa International Services Association, and incorporated herein by reference. For each command generated by, e.g., access device 40, a response from, e.g., card 12 is expected in a certain format. Those skilled in the art will recognize that other protocols may be used to implement features of the invention.

Interface device 30 operatively couples consumer card 12 with access device 40. Interface device 30, in a presently preferred embodiment, is a contactless interface device which is designed to transmit close-coupled power and data signals between consumer card 12 and access device 40.

Access device 40 includes a router 42, card handler 44, access device application hardware and software 46, a terminal interface application 48, and a buffer 50. Router 42 is hardware and software adapted to route information between functional blocks. Card handler 44, which may be integrally designed with interface device 30, provides functionality to accept and communicate with consumer card 12. For example, card handler 44 may include routines to control interface device 30 to perform initial power-on and detection of a card, such as in accordance with the protocol set forth in the ISO/IEC 10536 standards. Terminal interface application 48 forwards batch transaction information from access device 40 as well as receives software updates and commands

from terminal 60. Buffer 50 stores batch information regarding transactions made at access device 40.

Access device hardware and software 46 include functionality to perform a first phase of the transaction process, including performing a low-level authentication of consumer card 12 as well as functionality to permit, e.g., access where a successful low-level authentication occurs. In one specific embodiment, access device 40 is a transit access gate, and access device hardware and software 46 includes hardware and software to permit cardholder access through a turnstile if the transaction is authenticated. In other embodiments, access device 40 may be a toll booth gate, parking meter, vending machine, video game machine, controlled entry facility door, or other applications where it is desirable to quickly authorize stored value or other types of smart card transactions.

Terminal 60 includes a router 70, an access device interface 72, a security card handler 62, a security card 64, a data store 66, a terminal application hardware and software 68, and a concentration point handler 74. Router 70 is hardware and software adapted to route information between functional blocks. In conjunction with security card handler 62, security card 64 controls the command sequence of the terminal and provides transaction and batch security. Security card 64 may be a small form-factor card with a single-chip processor thereon, and is used to authenticate and validate each transaction. Because the security card may contain secret information, such as private encryption keys as will be discussed below, it is desirable that security card 64 be physically secured and controlled within terminal 60.

Security card 64 may contain a transaction identifier for each transaction (such as a counter incremented for each transaction), a session key, and master keys. Those skilled in the art will recognize that

other types of security modules may be used. For example, dedicated hardware security modules, removable smart card modules, or, in certain controlled environments, software modules may also be used. Further, security card 64 may be a smart card which has the ability to participate
5 in the stored value system by receiving token value which can then be passed on to other smart cards in the system.

While access device 40 and terminal 60 are shown to be separate or discrete entities, they may also be implemented as a single logical or physical entity.

10 Access device application 72 receives batch transaction information from access device 40 and forwards software updates and commands to access device 40. Terminal application hardware and software 68 includes functionality to control terminal actions.

Data store 66 controls the storage of purchase transactions
15 and totals. Concentration point handler 74 controls the sending and receiving of information to and from a concentration point 80. Concentration point 80 is a staging computer that communicates with any number of terminals 60 to collect batches of transactions. For example, concentration point 80 may sequentially make contact with a
20 number of terminals 60 at prearranged times on a daily basis to collect batches of transactions stored in the data stores of each terminal. Further, after concentration point 80 has collected the batch information from each terminal, concentration point 80 may forward update information to each terminal, such as: acknowledgment information
25 acknowledging receipt of the batch information; date changes for the terminal and access device; encryption key updates and changes; and bad card lists for the terminal and access device.

In one embodiment, concentration point 80 acts as a store and forward device and does not alter or validate the data it receives. The concentration point sends the collected transaction batches to a clearing, authorization and settlement system 90 for processing. Once processed, batch acknowledgments, along with other system updates, are sent to terminal 60 via the concentration point 80. The concentration point ensures a safe transfer of data between terminals and the clearing, authorization and settlement system 90, and prevents overloading of the system. A service provider, such as the party running the transit access terminals, contracts with a concentration point for collection of the transit payments. The concentration point may also be an existing central facility such as a central office of, e.g., a transit company which collects payments from all of the access devices operated by the company. Systems implemented according to the invention need not have concentration points, they may instead be implemented by having the terminal devices connect directly to clearing, authorization, and settlement system 90. As an alternative implementation where features are implemented in a token-type stored value system, the clearing, authorization and settlement system may not even be necessary (e.g., value may be simply passed from the consumer smart card to the security smart card and then from the security smart card to other recipient smart cards in the system).

Software functionality in consumer card 12, access device 40, terminal 60 and concentration point 80 may be implemented using a wide range of programming languages known in the art. For example, terminal interface application 48, or any of the other software modules, may be implemented using "C", "C++" Java or similar code. It is contemplated that Java code will work well for implementing the functionality described herein, as Java is platform independent, allowing the functionality to be used on a variety of device types.

In an alternative embodiment depicted in Fig. 2, a number of interface devices 30a-30n are provided with a number of access devices 40a-40n. These interface devices and access devices may be grouped to operate in conjunction with a single terminal 60 by providing a number of security cards 64a-64n and security card handlers 62a-62n in terminal 60. Each security card and handler will operate to interact with each access device. Further, a number of terminals 60a-60n may also be provided to work with a number of different groups of access devices. The result is an ability to support a number of devices with a relatively small number of terminals. A number of terminals 60a-60n may be coupled to each concentration point 80. Other configurations and groupings of devices may also be used, as will now be apparent to those skilled in the art.

Referring now to Fig. 3, a flow diagram depicting a first phase of a transaction process 100 involving consumer card 12 and access device 40 is shown. In operation, access device 40 has a wait state 102 where it awaits presentation of the next card. For example, access device 40 may be an admission turnstile at, e.g., a metro rail station, or any of the other access devices discussed herein, or other access devices designed to permit access to goods or services upon confirmation of payment. When a cardholder presents consumer card 12 in step 104, access device 40 detects that a card is present (step 106). Access device application hardware and software 46 and card handler 44 then generate a command or request for card information from the card (step 108). This command or request is presented to the card through interface device 30. The command or request presented to consumer card 12 may include transaction information such as an identification of the value which needs to be transferred (e.g., the amount of the fare to be paid).

Consumer card 12, upon receipt of the request for information, performs manipulations and calculations to prepare and forward the requested card information (step 110). These calculations may include specific calculations dictated by transit application program 15 if present, or may simply involve a determination of whether sufficient funds exist in stored value application program 13. For the purposes of this disclosure, it will be assumed that the calculations will be related solely to verifying whether funds exist in the stored value application; however, those skilled in the art will recognize that other calculations may be performed, such as checking transit attributes in transit application 15, e.g., checking the cardholder's status (senior, student, monthly passholder, etc.) or the like.

In this exemplary embodiment, the card information forwarded back to access device 40 may include information such as: card identification information; card issuer identification information; the value requested by access device 40; the expiration date of the card; and any other information needed to authorize and authenticate the transaction.

This card information is passed to access device 40 through interface device 30. When the card information is received, access device 40, using access device application hardware and software 46, performs a low level authentication (step 112). The type of low level authentication performed is chosen to reduce the amount of time needed to authenticate the transaction. For example, in one embodiment, low level authentication step 112 involves ensuring the card 12 has sufficient value to pay the requested value. Other steps may be included in the low level authentication process while still maintaining a fast response time, such as: checking the card number against a bad card list, performing some velocity or floor limit checking, verifying that transit application program

15 is not expired or incompatible with the requested access, etc. In an embodiment to be described in conjunction with Figs. 7-8, the first phase of the transaction process also serves to authenticate the access device to the card and the card to the access device.

5 If low level authentication step 112 produces a satisfactory result, access device application hardware and software 46 will authorize (step 114), e.g., entry or admission of the cardholder. If low level authentication step 112 fails (e.g., the cardholder had insufficient funds to cover the cost of the transaction or had an incompatible currency type, 10 etc.), admission or entry is declined (step 114) and access device 40 may revert to a wait state to await presentation of the next card (step 102), or representation of the declined card.

 Where authorization is given, a confirmation signal or message may be sent to consumer card 12 (in step 118) and the card can 15 store a receipt or other proof of transaction (step 120) in card memory. The cardholder is then permitted access or entry. For example, access device hardware and software 46 may generate an access permission signal (step 116) which activates a turnstile or other entry device. The same signature or receipt should also be sent to access device for use in 20 subsequent processing. This information may be, e.g., stored in the batch queue.

 Once access has been granted, access device application hardware and software 46 stores the card information received during step 112. The card information received for each transaction is stored in 25 buffer 50. This information is retained in the buffer for subsequent processing to be described. Once access device 40 has stored the transaction information in buffer 50, the device increments an internal counter (NT) (step 124). Access device 40 then reverts to a wait state to await presentation of the next card (step 102).

Access devices or other terminal devices implemented using features of the invention are suited for applications where a large number of cardholders need quick authorization response times. Typically, these applications are low-dollar transactions, such as transit terminals, where
5 users can not be expected to patiently wait for response times in excess of, e.g., 1.0 to 2.0 seconds. From the cardholder's perspective, systems implemented according to the invention process and approve the transaction almost instantly. By reducing the amount of information processing required to perform this access authorization, systems
10 implemented with features of the present invention are capable of authorizing access, transferring value, and storing a confirmation message using stored value cards in approximately less than 0.25 to 0.5 seconds, for example. Systems implemented using features of the invention allow the use of "open" stored value card system applications in
15 transit or access applications, giving cardholders the ability to use a single card for purchases at point of sale devices and transit applications.

At this point in the transaction, although the first phase of the transaction process 100 is completed and the cardholder has been granted access, the transaction is not yet fully authorized. Referring now
20 to Fig. 4, a flow diagram depicting a second phase of the transaction process 140 is shown. Performance of this second phase of the transaction process 140 is transparent to cardholders who use the access device, and will typically be performed some time after the cardholder has left the vicinity of the access device (e.g., after the cardholder has been granted
25 access to board or enter a transit system, or after the cardholder has passed through a toll gate, etc.).

The second phase of the transaction process commences in step 142, when a batch process is initiated by access device application hardware and software 46. This batch process may be initiated based on,

e.g., passage of time (e.g., once every 10 minutes, hour, or day, etc.) or after a certain number of transactions have accumulated in buffer 50 (e.g., once every 100 transactions, etc.). Alternatively, the process is performed whenever there is any information in buffer 50 and terminal 5 60 has CPU cycles available (i.e., the process is constantly running, but at a lower priority). While Fig. 3 depicts the access device as having control over initiation of the batch process, upon reading this disclosure those skilled in the art will recognize that terminal 60 may instead be responsible for initiating the batch process. For example, terminal 60 may 10 initiate the process after a certain amount of time has elapsed.

Once batch process (step 142) is initiated, access device application hardware and software 46 selects the first record in the buffer as the current record (step 144) (e.g., buffer 50 is a first-in first-out device or FIFO). In a currently-preferred embodiment, the first record to be 15 processed in the batch is the record with the lowest associated counter number. This current record is passed to terminal 60 via terminal interface application 48 and access device interface application 72 for processing. Terminal 60, using security card 64 and security card handler 62, performs a high level authentication on the current record in step 146.

20 This high level authentication may include, e.g., steps necessary to verify that the card used was a valid card and that the card was validly issued (steps which typically involve the decryption of information). By placing the responsibility for these computationally-intensive (and relatively slow) actions on access device 40 and terminal 25 60, interaction between card 12 and access device 40 is sped up considerably, without substantial compromise in authentication integrity and security.

The high level authentication process 146 may also include, e.g., steps necessary to generate a signed message for transmission to the

stored value system's clearing, authorization and settlement system. The signatures and computations required to perform this portion of the process are relatively time consuming; therefore, by performing these steps in the second phase of the transaction, the overall transaction time, from the consumer's perspective, is reduced substantially. This information is stored in data store 66 (step 148). Upon completion of high level authentication for the current record, a transaction counter is incremented in security card 64 (step 150). A counter in access device 40 is similarly incremented (152), and the next transaction in buffer 50 is then processed. Alternatively, the counter in access device 40 may be synchronized with the counter in security card 64 after all transactions in the current batch have been processed. Those skilled in the art, upon reading this disclosure, will recognize that the access device counter should be synchronized with the security card counter at some point before a new batch process is initiated. Alternatively, a synchronized clock or other means may be used to ensure access device 40 and terminal 60 process each transaction appropriately.

Access device 40 checks to determine if any more records exist in the batch (step 154). If more records exist, the next record is selected as the current record (step 144) and steps 146-154 are repeated until the batch is exhausted, at which point access device 40 will await initiation of the next batch process (step 156). Those skilled in the art will recognize that the batch process may alternatively involve passing the entire contents of buffer 50 to terminal data storage 66 at which time terminal 60 can iteratively process the batch without interacting with access device 40. Buffer memory 50 may be partitioned to permit a batch process to be completed in the background while initial authentication process 100 is completed in the foreground, allowing access device 40 to be used by, e.g., transit riders, while the batch is processed.

There may be instances where a card presented to access device 40 passes the low level authentication process of Fig. 3, but which for some reason does not pass the high level authentication process of Fig. 4. In this event, declined or failed transaction information is stored in data store 66 (step 149). This information is passed to clearing and authorization system 90 for subsequent resolution. For example, the cardholder or card issuing bank may be contacted to resolve the discrepancy, or the card information may be added to a bad card list to be stored in each access device 40 of a transit system.

Terminal 60 stores the authorized and failed transaction information in data store 66 and, e.g., at some subsequent time, forwards the information to the stored value system's clearing, authorization and settlement system 90 (step 158). This information may be initially forwarded to, e.g., a concentration point 80 or some other form of intermediary storage location, or may be forwarded directly into clearing, authorization and settlement system 90.

The result is a stored value system suited for applications where cardholders demand a very fast transaction approval and response time and where large numbers of transactions are presented for authorization.

One specific implementation of a two-phase transaction process incorporating features of the present invention will now be described by referring to Fig. 2 in conjunction with Figs. 5 and 6. In this embodiment, consumer card 12 is a card which carries public key generated certificates. While any of a number of cryptosystems may be used, the following discussion describes an implementation using public key cryptography. This specific embodiment of the present invention employs a known authenticating technique utilizing "digital signatures" which allows a first party to employ a secret key to "sign a message"

which the receiving party or a third party can validate using the first party's public key.

Using such digital signatures, it is possible for any digital message to be signed so that the recipient is assured that the message is received as sent, and that it is not a forgery. This is done by using the "public key" and digital signature methodology such as described by at least U.S. Pat. No. 4,405,829, hereinafter referred to as RSA technique. There are other public key and signature techniques which use methodologies other than RSA. Examples of other public key or signature techniques include Fiat-Shamir, Ong-Schnorr-Shamir, and several others derived from zero-knowledge proof techniques. The present invention is not limited to any particular public key or signature technique. These techniques, and others, are described in "Applied Cryptography", by Bruce Schneier, Second Edition 1996, which is incorporated herein by reference for all purposes.

A user who has a public/private key pair can digitally sign a message by "encrypting" (or "signing") the message or a hash of it with the user's private key before transmitting the message. Recipients of the message can verify the message or signature by decrypting it with the sender's public encryption key. Anyone who has the user's public encryption key can read the message or signature, but only the sender having the secret decryption could have created the message or signature. In general, the digital signature assures the recipient of the integrity of the message at the time the signature was computed. Again, the use of these public key techniques is not necessary for implementation of systems according to the present invention, and are merely described herein as one specific embodiment.

In an exemplary embodiment to be described in conjunction with Figs. 2, 5, and 6, consumer card 12 stores the information shown below in Table 1.

DATA ITEM	DESCRIPTION
ICERT	Card Issuer's Public Key certificate
CCERT	Card Public Key certificate
BIN	Card Issuer identification number
ID	Card serial number
ALGCA	Algorithm used for purchase
DEXP	Expiration date of card
BAL	Balance of the card purse
CURR	Currency of the card purse
CEXP	Currency exponent of the purse
AM	Authentication mode
NT	Transaction number
VPKI	Certificate authority public key number
CSKEY	Card secret key

--Table 1--

5 Some of this information is stored in the card when the card is personalized (e.g., the BIN, ID, ALGCA, DEXP, CURR, CEXP, AM, VPKI, CKEY, CCERT, and ICERT). Other information regarding the card balance (BAL) and the counter or transaction number (NT) are updated as the card is used.

10 A public key certificate hierarchy is used in this specific embodiment. As an exemplary hierarchy, a first public key pair (CAPK, CASK) is generated for a certificate authority (CA). A second public key pair (IPK, ISK) is generated for the card issuing bank. And a third public

key pair (CPK, CSK) is generated for each card 12. The issuing bank sends their public key pair (IPK, ISK) to the certificate authority (CA) which generates an issuer certificate (ICERT) using CASK. ICERT is sent to the issuing bank. All cards issued by the issuing bank are personalized with this issuer certificate (ICERT) as provable evidence that the card is issued by a valid issuer. Also during personalization, the issuing bank generates a card certificate (CCERT) using the card public key pair (CPK, CSK) and the issuing bank's secret key (CASK). This serves as provable evidence that the card is a valid card. CCERT and ICERT are stored in consumer card 12 (see Table 1, above).

In this particular exemplary embodiment, the card certificate (CCERT) is formed using RSA encryption techniques and includes information uniquely identifying the card, such as: information identifying the card and the issuer of the card (e.g., ID and BIN); information regarding the formation and expiration of the certificate; and information regarding the algorithm used to generate the certificate. The card certificate may be formed and stored on the card when the card is personalized, and may be generated using public key encryption techniques. The card certificate (CCERT) also contains a hash (using, e.g., the Secure Hash Algorithm SHA, set forth in the Digital Signature Standard NIST FIPS PUB 186, U.S. Department of Commerce, May 1994) of the card's public key CPK.

The issuer's certificate (ICERT) may also be formed using RSA techniques and include information identifying the card issuer, information identifying the certificate (e.g., expiration date, etc.), and information regarding the algorithm used to generate the card certificate (CCERT). ICERT may also contain a hash of the issuer's public key IPK.

In this manner, a party having the certificate authority (CA) public key (CAPK) and the issuer's certificate (ICERT) can recover the

issuer's public key (IPK), while a party having the issuer's public key (IPK) and the card's certificate (CCERT) can recover the card's public key (CPK).

Referring now to Fig. 5, one specific implementation of a first phase of a transaction process 200 according to the invention is shown. Access device 40 loops in a wait state 204 for the next card to be presented for access authorization. Consumer card 12 is presented to an interface device 30 of access device 40 in step 202. Access device 40 provides power and performs initial protocol setup (e.g., generates an ATR sequence as described in ISO/IEC Standard 10536, etc.) to establish contact with card 12 (step 206). Card 12 responds to this initial sequence (208).

Access device 40, upon verifying that card 12 is a compatible card, proceeds to send a SELECT command to the card (step 210) to select stored value application program 13 as the application to be used for this particular transaction. In response to the SELECT command, card 12 replies (step 212) with information regarding stored value application program 13. Those skilled in the art will recognize that this SELECT command and response may vary from system to system, and is provided here only as an example.

At this point, access device 40 sends an INITIALIZE IEP FOR PURCHASE command to card 12 (step 214). Card 12, in response, first increments a transaction counter (NT), and then forwards information regarding the card, including, for example: BIN, ID, ALGCA, DEXP, BAL, CURR, CEXP, AM, NT, and VPKI. At this point, access device 40 may perform a low-level authentication (step 218) to determine if the transaction can proceed. For example, this low-level authentication may include verifying that the currency type (CURR) is supported (e.g., if the access device requires U.S. Dollars, the value of CURR must indicate

the card holds value in U.S. Dollars). Low-level authentication step 218 may also include verifying that the card balance BAL is greater than or equal to the cost of the purchase (e.g., the cost of the fare purchased). Alternatively, access device 40 can rely on card 12 performing the verification of funds availability and compatible currency, and access device 40 may simply (or additionally) verify that card 12 has not yet expired (i.e., check card expiration date CEXP). Whatever the authentication steps chosen for performance by access device 40, they should be capable of performance quickly, and preferably without the need for computationally-intensive cryptography.

Access device 40 checks to see if the required conditions are satisfied (step 220). If low-level authentication is not satisfied, access device 40 terminates the transaction and reverts to wait state 204 without further processing.

If low-level authentication is satisfied, access device 40 proceeds to issue a READ RECORD command (step 222). In response to this first READ RECORD command, card 12 responds by sending issuer's certificate (ICERT) (step 224). This certificate is stored in access device 40 (step 226). Access device 40 then issues a second READ RECORD command (step 228), in response to which card 12 sends card certificate (CCERT) (step 230) to access device. To speed up the process, these certificates may be stored in memory or cached by storing frequently-used certificates or at least a list of recently-used certificates.

Whether retrieved from the card or from a cache, access device 40 stores the retrieved certificate (step 232) and issues a DEBIT IEP command to the card (step 234). This DEBIT IEP command is passed to card 12 along with information regarding the purchase amount (M). Information regarding the type of currency, the currency exponent, and the terminal identifier and location may also be passed with this

command. In addition, information to ensure the transaction message generated by the card is unique may also be passed, including: time, date, and the current value of the access device's transaction counter (NT).

Card 12 responds to this DEBIT IEP command by first
5 performing several internal calculations, including verifying that sufficient value is available to make the purchase. The amount of the purchase (M) is decremented from the card balance (BAL) and a record of the transaction is stored in non-volatile memory of the card (step 240). In addition, card 12 generates a signature of the transaction (SP) for
10 transmission to access device 40. This signature (SP) is generated using the card's secret key (CSK) and includes, for example, information which may be used to prove the fact of the transaction, such as: the amount debited; the new balance of the card; the card's expiration date; the currency code; the currency exponent; the card's transaction number; the
15 access device's transaction number; access device identifying information (including information regarding the security card 64 associated with the particular access device); etc. This signature (SP) may also be stored in non-volatile memory of card 12 (step 240).

Access device 40 receives and stores this information (step
20 238) in buffer 50. Access device 40 then permits cardholder access to the goods or services purchased (e.g., entry to a transit system may be permitted by activating a turnstile), or provides confirmation to a system operator that the transaction has completed the first phase of the transaction process 200 (e.g., a visual signal may be presented to a bus
25 driver, etc.)

This first phase of the transaction process 200 may be completed in a very quick manner (e.g., on the order of 0.25-0.5 seconds from the time the card is presented to the interface device until the time of access permission), while providing a relatively sure means of

authenticating the existence of funds to pay for the transaction. The access device 40 now has sufficient information stored in buffer 50 to complete the second phase of the transaction process (e.g., to perform a full authentication of the card and funds).

5 Referring now to Fig. 6, a second phase of transaction process 300 according to one specific embodiment of the present invention is shown. This authentication process takes place between access device 40 and terminal 60 independent from the interaction between access device 40 and consumer cards. In the specific embodiment shown,
10 terminal 60 is shown as assuming the responsibility to contact access device 40 to initiate a batch second phase transaction process 300.

 In step 302, terminal 60 determines whether it is time to initiate a batch process (step 304). This determination may be made based on the lapse of time or some other factor. When a batch process is
15 initiated, access device 40 is notified and sets a pointer to the top transaction record stored in buffer 50 (step 306), and provides some indication to terminal 60 that it is ready for batch processing. Terminal 60 then proceeds to sequentially perform high-level authentication and processing for each transaction record stored in buffer 50.

20 Terminal (or, more particularly, security card 64) controls the high-level authentication and processing for each transaction record. This process begins in step 308 when security card 64 generates an INITIALIZE IEP FOR PURCHASE command which is passed to access device 40. The access device, under control of terminal interface
25 application 48, responds with card information from the first transaction record, including information such as: BIN, ID, ALGCA, DEXP, BAL, CURR, CEXP, AM, NT, and VPKI (information which was sent from consumer card 12 in response to the INITIALIZE IEP FOR PURCHASE command described in conjunction with Fig. 5, above).

Security card 64 then issues a READ command (step 314), prompting access device 40 to send the issuer's certificate ICERT from the current transaction record (step 316). Security card 64, using a Certification Authority public key (CAPK) stored in security card memory, recovers the issuer's public key (IPK) from the issuer's certificate (ICERT). If this recovery cannot be performed, the transaction fails high-level authentication, as the consumer card used to perform the purchase transaction was not validly issued.

If ICERT is successfully recovered, security card 64 generates another READ command (step 320), prompting access device 40 to reply with the card certificate (CCERT) in step 322. Security card 64 recovers the card public key (CPK) using the issuer's public key (IPK) recovered in step 318. If the card public key cannot be successfully recovered, the high-level authentication process fails.

If the card public key (CPK) has been successfully recovered, the authentication process continues to step 326, where security card 64 issues a DEBIT IEP command. This DEBIT IEP command is passed to access device 40 along with information regarding an identification of the security card 64. In addition, information to ensure the transaction message generated by the card is unique may also be passed, including: time, date, and the current value of transaction counter (NT) of security card 64.

Access device 40 responds to this DEBIT IEP command by forwarding the signature of the transaction (SP) generated by consumer card 12. Security card 64 performs the necessary cryptographic steps needed to authenticate the signature of the transaction (330). If this authentication is successful, the transaction from the current record in buffer 50 of access device 40 has been successfully high-level authenticated, and the paid party (e.g., a transit system) will be

guaranteed payment of funds equal to the transaction amount, while the account of the paying party (i.e., the holder of consumer card 12) will be decremented in an amount equal to the transaction amount.

5 Security card 64 may then sign the transaction record (step 332) using, e.g., a message authentication code (MAC) or the like. Additionally, security card 64 may sign a batch header (step 334) and store the record (step 336) for subsequent forwarding to, e.g., concentration point 80 as described above in conjunction with Fig. 2 and Fig. 4.

10 Terminal 60 then requests the next transaction from access device 40. If the transaction was not the last transaction in buffer 50 (step 340), access device increments counter NT and retrieves the next record. Steps 306-342 are then repeated until all records in buffer 50 have been subject to high-level authentication.

15 Embodiments of the present invention, thus, permit a stored value system which uses public key techniques to be used in conjunction with transit applications or other applications which demand fast authorization response times.

20 A further embodiment of the present invention will now be described by referring to Fig. 2 in conjunction with Figs. 7 and 8. In this embodiment, a specific embodiment of a fast smart card transaction process will be described which may be used in conjunction with a symmetric key based smart card system. Symmetric encryption techniques, such as the commonly-used Data Encryption Standard (DES),
25 are used in many smart card systems. Symmetric encryption techniques are used to authenticate participants to a transaction and to encrypt data.

These processes can consume a substantial amount of processing time during a typical transaction. For example, using existing available smart card technology, each DES encryption operation conducted by a card (including both the consumer card and a security module, for example) may take around 10-20mS. A typical smart card stored value transaction can include between 15-25 DES operations in the interaction between a security module and a consumer card. This time is in addition to any time required to go through an ATR and power on sequence, and any time required to transfer data and do other computations in the transaction sequence. Thus, a DES-based (or other symmetric key) stored value card transaction can take 0.5 seconds or even longer. While this type of a transaction is quicker than most public key or asymmetric-type transactions, it is still too time consuming for most transit or access environments. Embodiments of the present invention reduce the amount of processes which must be performed while the consumer smart card is present in a transaction so that the transaction may occur more quickly as is desirable in, e.g., access-type applications.

Referring now to Figs. 2 and 7, a first phase 400 of a transaction process will now be described. In this process, consumer card 12 is presented to access device 40a via interface device 30a (step 402). Access device 40a loops in a wait state for a card to be presented (step 404). Access device application hardware and software 46 and card handler 44 then initiate a card power-on and ATR sequence in step 406. Card 12 may perform some calculations or processing to determine that, for example, transit application 15 requires funds from stored value application 13. Those skilled in the art will recognize that a number of different calculations and processes may take place at this time.

Once card 12 has responded, and access device 40a has determined that, e.g., value needs to be withdrawn from stored value

application program 13 of consumer card 12, access device generates an INITIATE IEP FOR PURCHASE command (step 410) and sends this command to card 12. Card 12 replies with a variety of card data elements, including, for example: BIN, ID, ALGCA, DEXP, BAL, CURR, CEXP, AM, NT and VKP (these data elements are stored in card 12 as generally described above in conjunction with Table 1). At this time, card 12 may also generate a session key (KSESP) for use in authentication during the transaction. The session key is not sent to access device 40, but the other data elements are (step 412).

10 In step 414, access device 40 selects an Entry ID number to keep track of the transaction. This Entry ID number is preferably unique for every open transaction in the system, and is used to ensure that access device 40 and security card 64a are able to keep track of each specific open transaction. Only a single transaction will be open at any
15 time for a given Entry ID. Once an available Entry ID is selected (step 414), access device 40 generates an INITIATE PAYMENT command and routes the command, along with the newly selected Entry ID, and the card information received from step 412, to security card 64a (step 416).

Security card 64a, using the card information, generates two
20 signatures (S2 and S3) which will be used to perform mutual authentication between security card 64a and consumer card 12. Those skilled in the art will recognize that other authentication processes may also be used and that this particular approach is for the purposes of disclosure only. In a currently preferred-embodiment, the S3 signature is
25 generated by signing (using KSES generated by security card 64a) data including: an ID of security card 64a; a counter of security card 64a; a balance amount of consumer card 12; CURR of consumer card 12; and CEXP of consumer card 12.

The S2 signature (in a currently-preferred embodiment) is formed by signing (again using the session key KSES) data including: an ID of security card 64a; a counter of security card 64a; and a balance amount of consumer card 12. Security card 64a stores these signatures.

5 Security card 64a then sends a GENERATE DEBIT IEP command back to access device 40a (step 418). Included in the GENERATE DEBIT IEP command, in a currently-preferred embodiment, are the S2 signature and the two most significant bytes of the S3 signature. Only the two MSB of the S3 signature are passed to access device 40a to ensure that access

10 device 40a is unable to create a full transaction record. This guards against an attacker posing as an access device or taking control of an access device to defraud the system.

Access device 40a, upon receipt of the data from security card 64a, generates a DEBIT IEP command (step 420) and sends

15 information including S2 and other information about security card 64a to consumer card 12. Consumer card 12 proceeds to independently generate its own version of S2 (S2') using the received information (step 422). Consumer card 12 then compares S2' to S2 to authenticate security card 64a and terminal 60a (step 424). If the two signatures do not match,

20 the transaction should be aborted (step 426). If they do match, consumer card 12 proceeds by generating its own version of S3 (S3') (step 428) and sends this signature to access device 40a for authentication. Access device 40a compares the card's version of the signature (S3') to the two MSBs of the security card's version of the signature (S3) to determine the

25 authenticity of the card (step 430). If the 2 MSBs do not match, the transaction should fail (step 434). If they are equal, it is likely that both card 12 and security card 64 are authentic and consumer card 12 has properly reduced the card balance by the correct transaction amount. If this is the case, access device 40 writes the transaction information to a

queue (step 436) and authorizes the transaction by, e.g., granting access to a product or services (step 438).

In a currently-preferred embodiment, the following information is written to the queue: data from card 12's response to
5 INITIALIZE IEP FOR PURCHASE; data from the card 12's response to DEBIT IEP FOR PURCHASE (including the card signature S3); a transaction counter from the security card for the specific transaction; an identification of the security card; and the debit amount of the transaction.

10 Once access has been granted (step 438) and information has been written to queue (step 436), the first phase 400 of the transaction process are complete. Several relatively time-consuming encryption and data transfer processes have been avoided in this first phase 400. To
15 increase throughput and efficiency from the perspective of a cardholder, these encryption and data transfer processes are relegated to a second phase 500 of the transaction process which will now be described in conjunction with Fig. 8. Those skilled in the art, upon reading this disclosure, will recognize that fast smart card transactions can be
20 achieved by performing other processes in later phases while the cardholder is not present, and that the techniques described herein are examples of techniques according to embodiments of the present invention.

Referring now to Fig. 8 in conjunction with Fig. 2, a second phase 500 of the transaction process is shown. Second phase 500 may
25 take place at any time after a cardholder has presented a card at access device 40 and after first phase 400 (Fig. 7) has completed. In general, second phase 500 is preferably performed in the background as a batch process. The batch process may be initiated by any of a number of factors, e.g., a timer may initiate the batch process after a period of time has

elapsed, or a counter can keep track of the number of transaction records stacked in the queue. Whatever factor is used, once a determination is made to process the batch (step 502), a batch access is initiated (step 504) and access device 40a acts to set a pointer to the first Entry ID in the queue (step 506). The transaction record corresponding to the first Entry ID is read from the queue (step 508) and access device 40a issues a COMPLETE PAYMENT command, transmitting data from the transaction record to terminal 60a and security card 64a (step 510). Security card 64a, upon receipt of the information along with the COMPLETE PAYMENT command, compares the S3 signature it had previously generated and stored (see step 418 of Fig. 7) during first phase process 400 with the S3' signature generated by card 12 and received with COMPLETE PAYMENT command. If the two signatures match, security card 64a has verified that consumer card 12 was an authentic card. If the comparison (step 512) fails (i.e., S3 is not equal to S3') the transaction fails and security card 64a stores information regarding the failure for later resolution (step 514).

If security card 64a is successful at authenticating consumer card 12, security card 64a can complete processing for the transaction. The transaction is completed by the performance of several encryption steps. First, security card 64a signs the transaction record using a secret key of the security card (step 516), and then security card 64a signs a batch header of all transactions processed by the security card (step 518), again using a secret key. The signed information is then stored in security card 64a or elsewhere in terminal 60a. Those skilled in the art will recognize that other types of transaction completion steps may also be required, depending upon the type of smart card system used.

Once security card 64a has completed the transaction, the Entry ID is incremented (step 522) and the next transaction is processed.

In a preferred embodiment, access device 40a controls the Entry ID and it is access device 40a which increments the Entry ID. If the last transaction in the queue has been reached (determined by checking at step 524), the Entry ID number may be reset (step 526). Second phase process 500 may repeat until all transaction information in a queue are processed. The processed transactions may then be sent to concentration point 80 for processing through clearing, authorization and settlement system 90.

In the specific embodiment described in connection with Figs. 7 and 8, a relatively substantial amount of processing time is done in the background (e.g., in second phase process 500) so that a cardholder does not need to wait an unreasonably long time to receive access authorization at, e.g., a transit turnstile. In particular, a relatively substantial amount of time is saved by performing steps 512-522 in the background while the cardholder is not present. Those skilled in the art, upon reading this disclosure will realize that features of the invention may be used to split other smart card transaction processes into multiple phases to reduce the amount of processing time required while a cardholder is present.

Referring now to Fig. 9, a generalized overall transaction process 600 according to embodiments of the present invention is shown. Overall transaction process 600 includes a first step of selecting an application (step 602). This step can involve a variety of decisions and operations depending upon the nature of the application and environment. For example, once a card is presented to a transit turnstile, the turnstile may first select a card's transit application and then, if required by the transit application, then select a stored value application of the card. Once an application is selected, a first phase of the transaction may be performed (step 604). In general, this first phase

should encompass any low-level authentication required to authorize access to products or services using the card. If the low-level authentication fails (step 608), the transaction should be aborted. If the low-level authentication succeeds, transaction data should be stored (step 610).

Later, or contemporaneously in background processing, a subsequent phase(s) of processing may take place (step 612). This subsequent phase(s) should be designed to perform any additional, or high-level authentication processes, and should also perform any required formatting or encryption of transaction information. If these steps are successful, the transaction data may be finalized (step 618). If unsuccessful, the transaction should be aborted (step 616) and any appropriate remedial steps may be taken.

While the above is a complete description of the preferred embodiments of the invention, various alternatives, modifications, and equivalents may be used. For example, while specific functional responsibilities were allocated to the access device or terminal, such as initiation of the batch process, the allocations may be reversed in some instances while still producing the multi-phase transaction process of the invention. Further still, those skilled in the art, upon reading this disclosure, will recognize that transaction processes may also be split into more than two phases in some situations, thereby resulting in further speed and processing efficiencies.

Therefore, the above description should not be taken as limiting the scope of the invention which is defined by the appended claims.

WHAT IS CLAIMED IS:

1. A method for using a smart card to gain access through an access device upon payment of a value (V), the method comprising the steps of:

operatively coupling said smart card to said access device;

5 reading at least a first and a second set of data from said smart card;

performing a first authentication process on said at least first set of data;

10 permitting access if said step of performing a first authentication process meets a required condition;

storing said at least first and second sets of data in a memory of said access device; and

15 performing a second authentication process on said at least first and second sets of data after said step of permitting access is accomplished.

2. The method of claim 1, wherein said first set of data includes information indicating a balance (B) of funds available in said smart card, and an expiration date (DEXP) of said smart card.

20 3. The method of claim 1, wherein said second set of data includes a card public key certificate, a card issuer public key certificate, and a signature generated by said smart card.

4. The method of claim 2, wherein said first authentication process includes the step of verifying that said balance (B) is greater than said value (V).

5. The method of claim 2, wherein said first authentication process includes the step of verifying that said expiration date (DEXP) has not passed.
6. The method of claim 2, wherein said required condition is said
5 balance (B) being greater than said value (V).
7. The method of claim 3, wherein said second authorization process includes the steps of verifying said card certificate, verifying said issuer certificate, and verifying said card signature.
8. The method of claim 1, wherein said second authorization is
10 performed between a terminal device and said access device.
9. The method of claim 8, wherein said terminal device includes a security card.
10. An access system, including:
- an interface device, having contacts for coupling with a smart card
15 to read at least a first and a second set of information;
- an access device, coupled to said interface device, having at least a first processor for performing a low-level authentication of said first set of information received from said smart card;
- a memory in said access device, storing said at least first and
20 second set of information; and
- a gate device, coupled to said access device, said gate device granting access to a cardholder after said low-level authentication is performed.
11. The access system of claim 10, wherein said gate device is a
25 turnstile.

12. The access system of claim 10, wherein said first set of information includes at least a balance (B).

13. The access system of claim 12, wherein said low-level authentication includes verifying that said balance (B) is greater than a
5 cost of access.

14. The access system of claim 10, further comprising:

a terminal device, coupled to said access device, said terminal device having at least a first security module for performing a high-level authorization of said at least first and second information received from
10 said card.

15. The access system of claim 14, further comprising:

a concentration point, coupled to said terminal device, for receiving information regarding said high-level authorization.

16. An access control system, comprising:

15 a plurality of card reading devices, each having a contact structure for reading at least first and second data from a smart card;

a plurality of access devices, coupled to said card reading devices, for performing a low-level authentication on said first data from said smart card, said access devices having a memory for storing said first and
20 second data from said smart card;

a terminal device, coupled to said plurality of access devices, for performing a high-level authentication on said at least first and second data from said smart card.

17. The access control system of claim 16, wherein said terminal device
25 includes a plurality of security cards, each security card for use in

performing a high-level authorization of said first and second data from a specific one of said plurality of access devices.

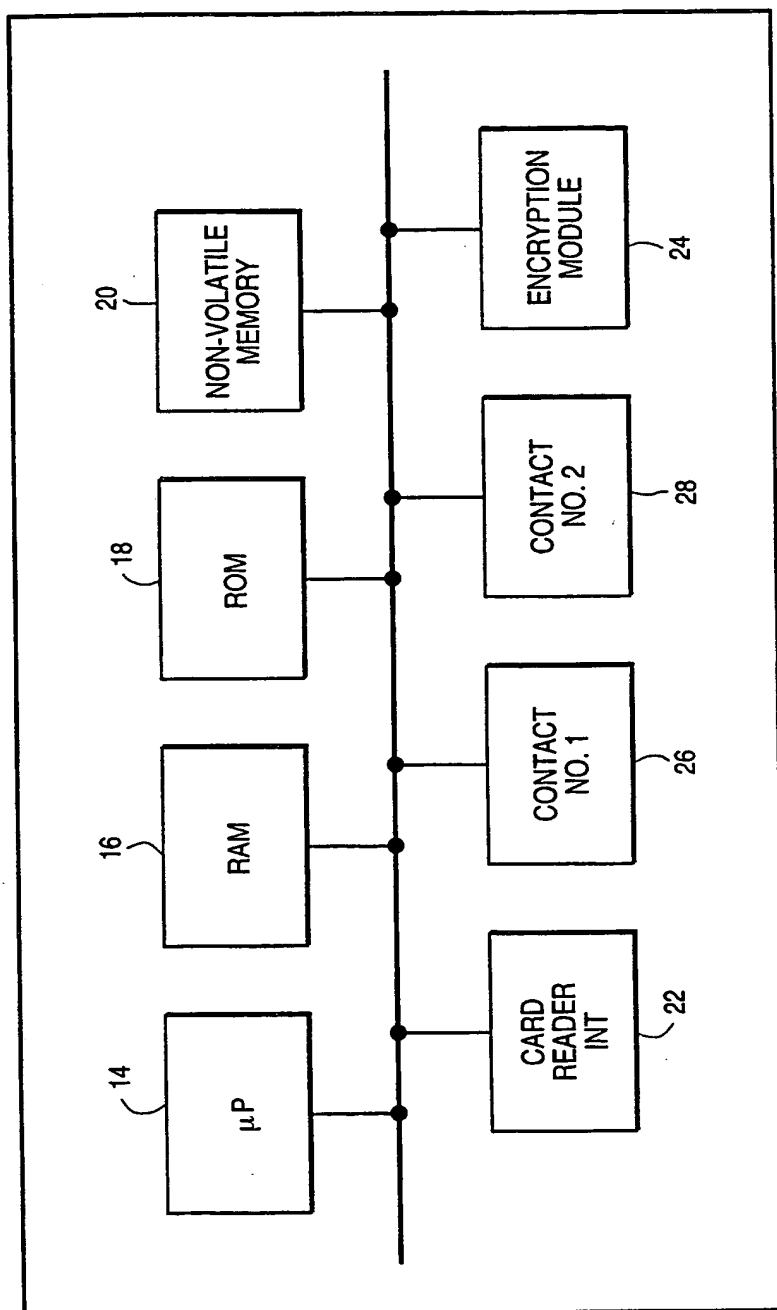


FIG. 1

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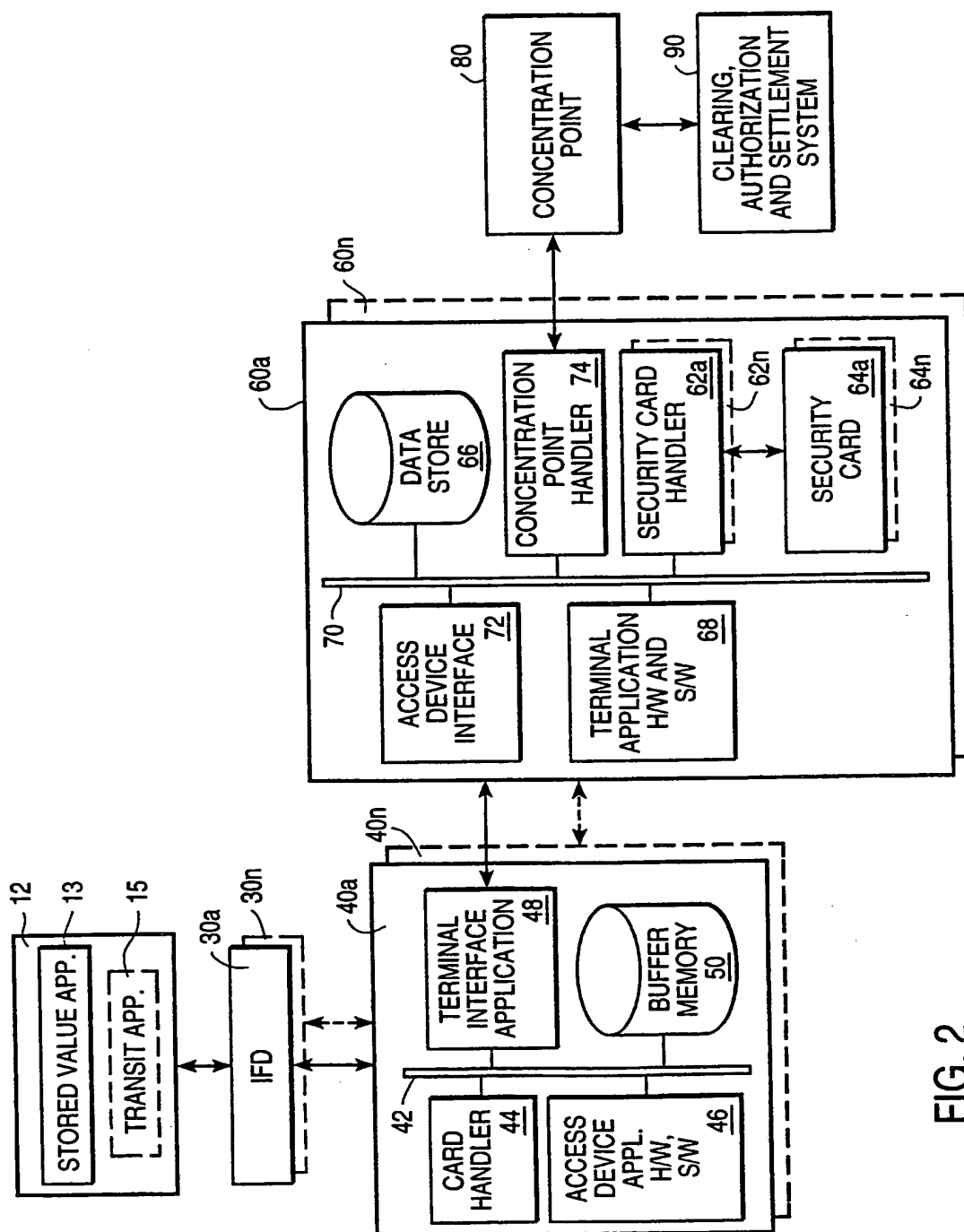


FIG. 2

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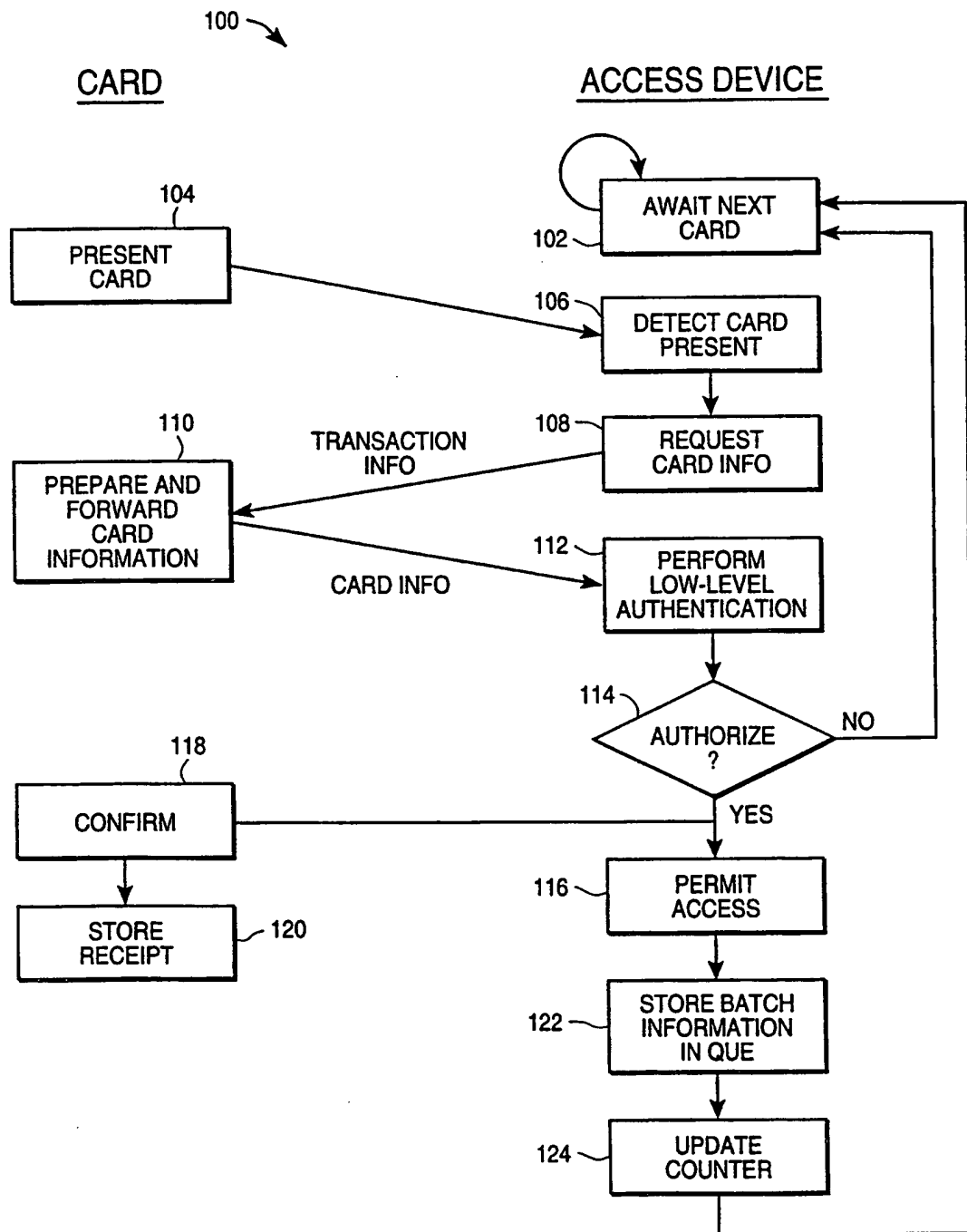


FIG. 3

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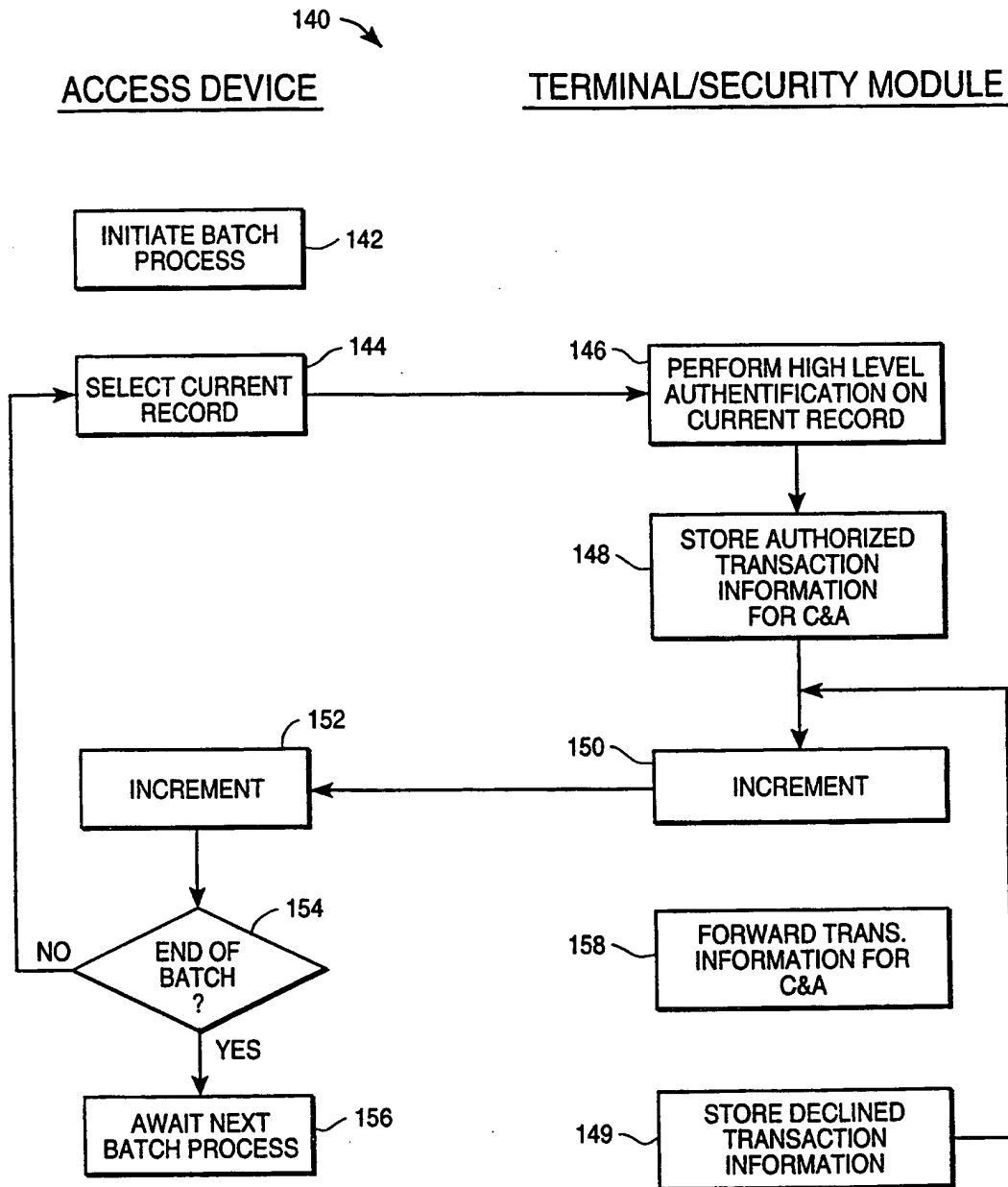
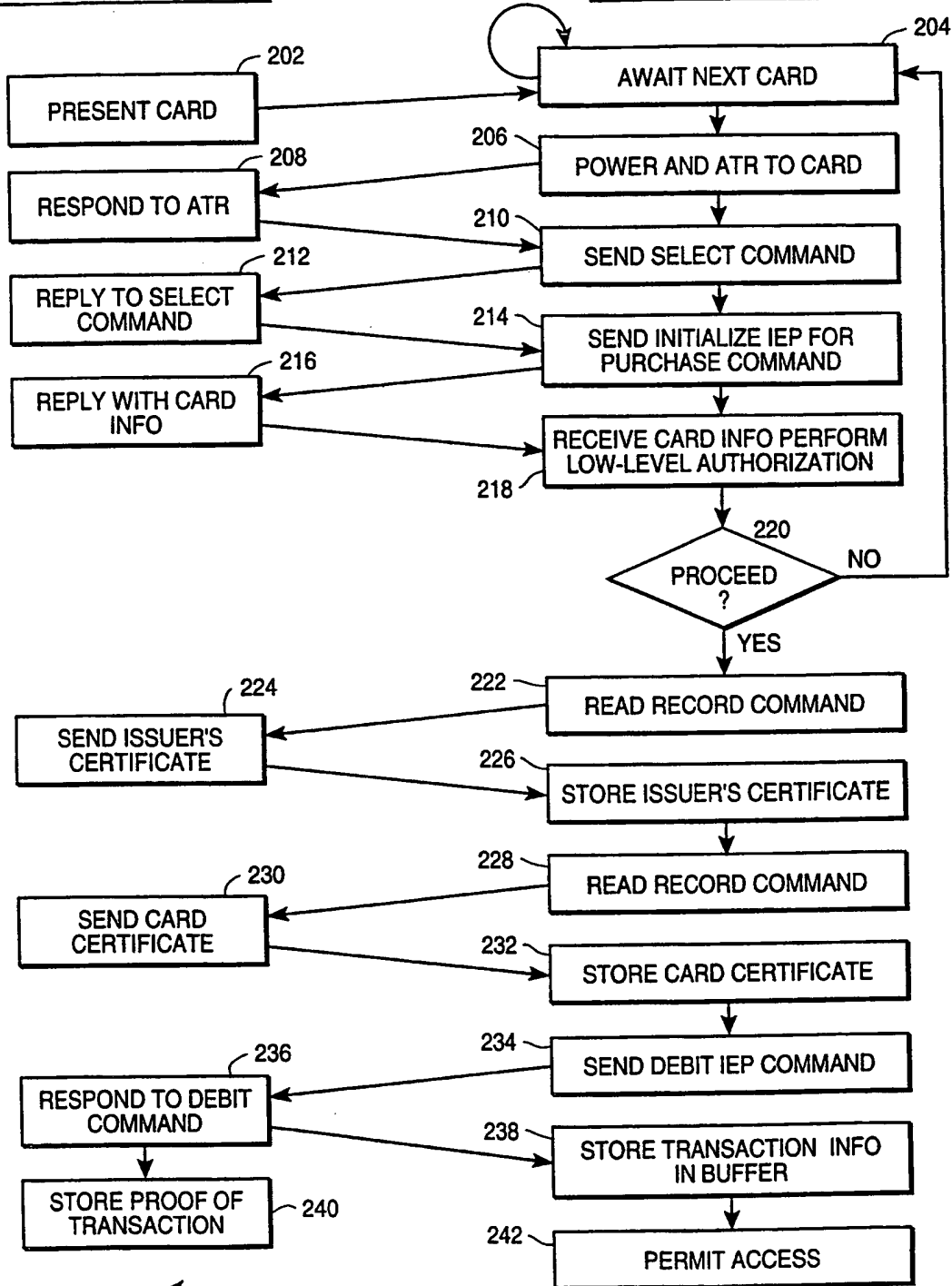


FIG. 4

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CONSUMER CARDACCESS DEVICE

200 ↗

FIG. 5

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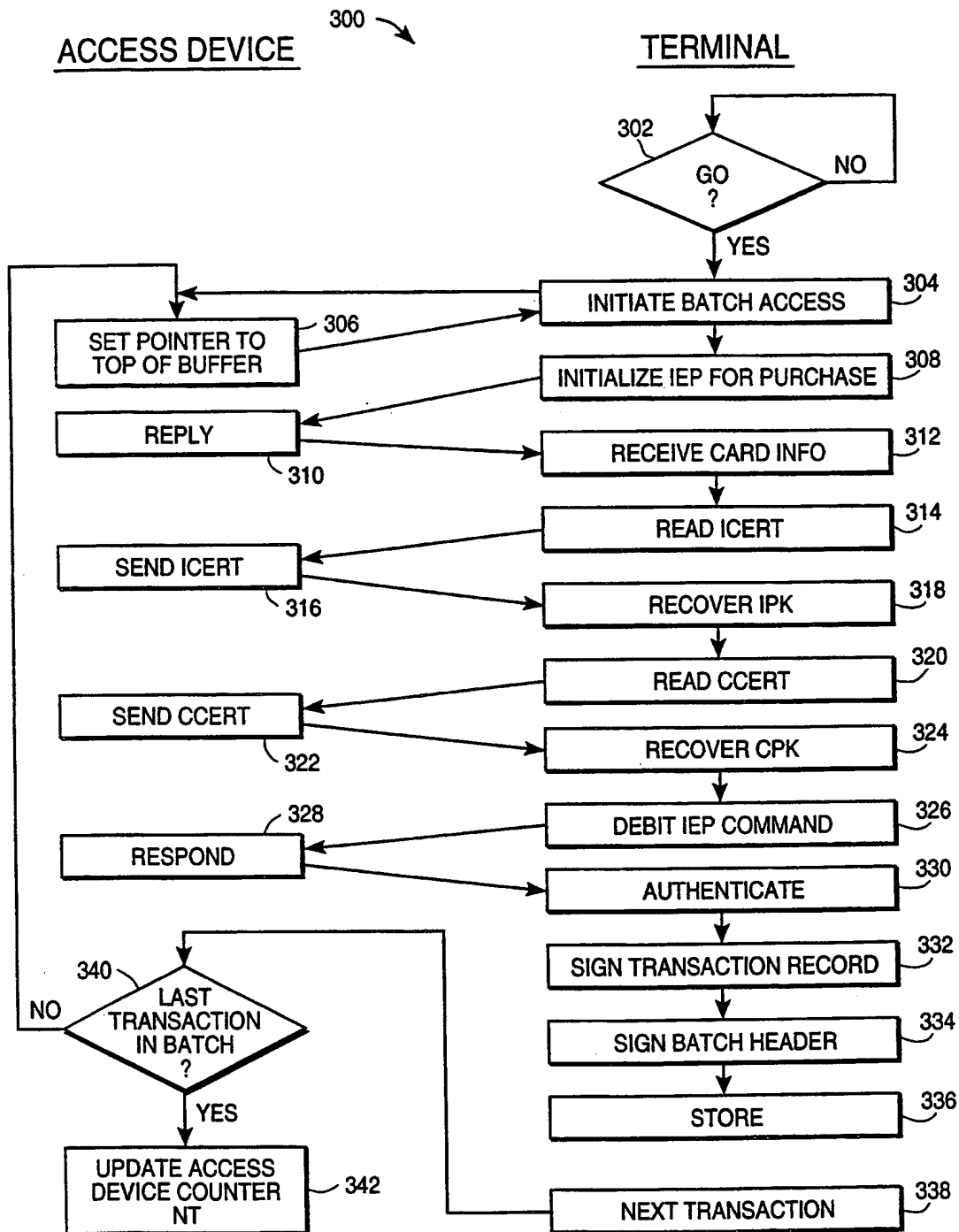


FIG. 6

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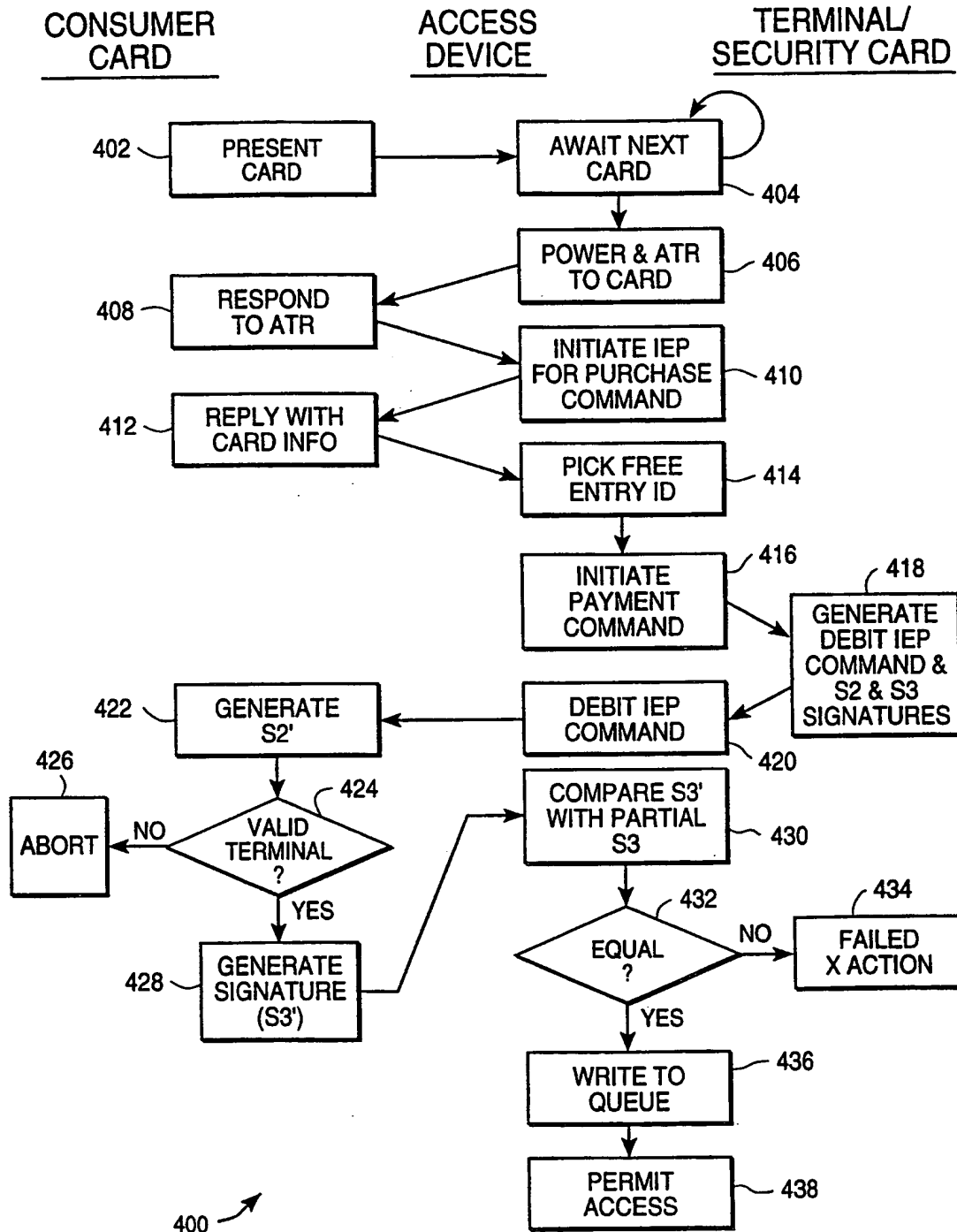


FIG. 7

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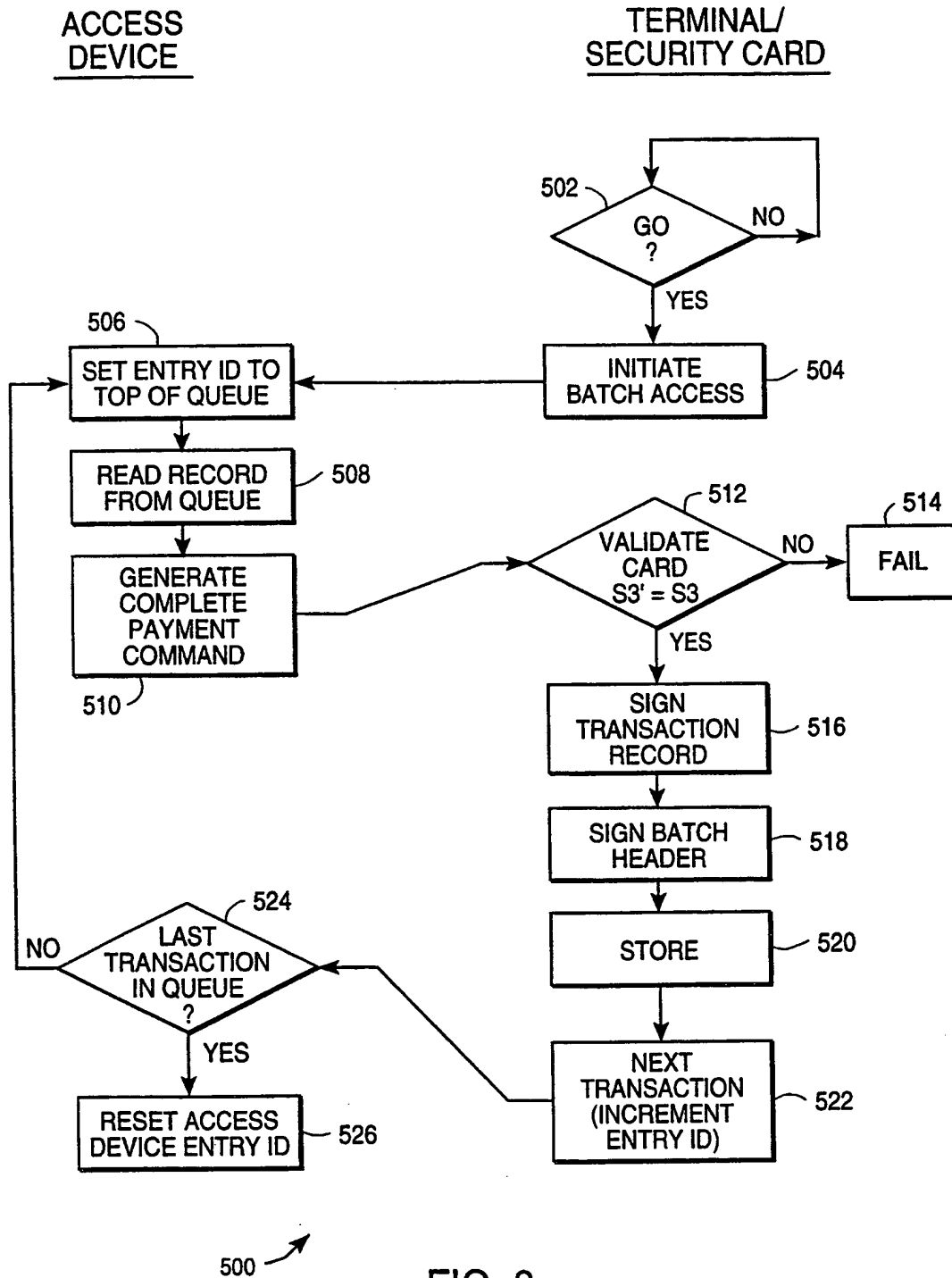


FIG. 8

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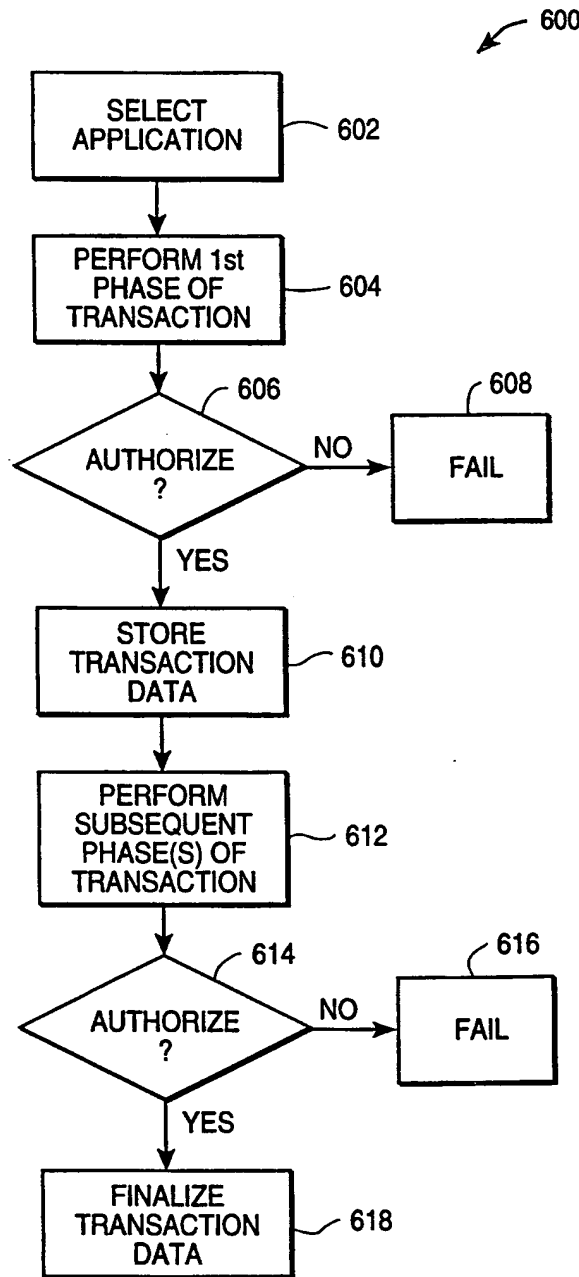


FIG. 9

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/17352

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G06F17/60 G07F7/08

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 6 G06F G07F

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)

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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X	WO 95 22125 A (GEMPLUS CARD INT ; VALADIER JEAN LOUIS (FR)) 17 August 1995 see page 10, line 1 - page 13, line 20 ---	1, 3, 7-9, 16, 17
X	US 4 891 503 A (JEWELL THOMAS L) 2 January 1990 see column 2, line 59 - column 3, line 24 ---	1, 2, 4-6, 8, 16
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

13 January 1999

Date of mailing of the international search report

22/01/1999

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INTERNATIONAL SEARCH REPORT

International Application No.
PCT/US 98/17352

C.(Continuation) 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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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

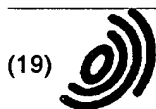
Information on patent family members

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Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 039 402 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.09.2000 Bulletin 2000/39

(51) Int. **G06F 17/60**
Cl.⁷:

(21) Application number: **00200960.3**

(22) Date of filing: **17.03.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT
LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **19.03.1999 US 125155 P**
26.03.1999 US 126524 P

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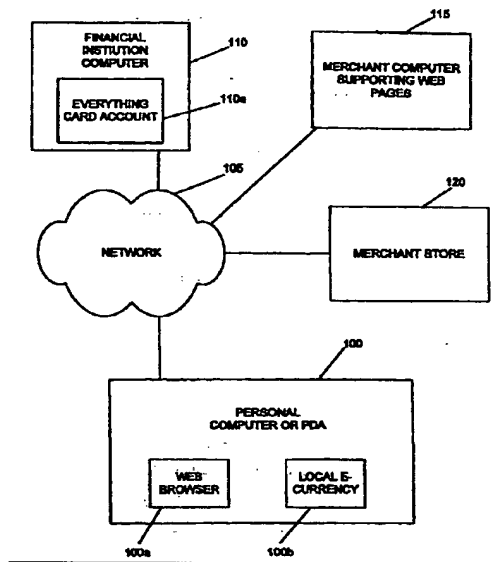
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Remarks:
A request for correction of the
description (change of the cited
priority number 09/190727 into
09/190993) has been filed pursuant to
Rule 88 EPC. A decision on the request
will be taken during the proceedings
before the Examining Division
(Guidelines for Examination in the EPO,
A-V, 3.).

(54) **Systems and methods of electronic payment and financing the same**

(57) A system and method are described wherein a financial institution establishes an electronic card account on its own computer. The financial institution issues digital bearer certificates to a consumer for use in making purchases over a network. The digital bearer certificates are stored on a financial institution's computer until the consumer instructs the computer to forward one to a merchant when purchasing a good or service. In addition to maintaining these digital bearer certificates, the electronic card account also holds credit card numbers for use in making purchases over the network. Finally, the financial institution receives money for the digital bearer certificates up front so that it may invest that money for profit.

Figure 1



Description

CONTINUING DATA

This application claims priority to United States provisional application number 60/125,155 filed on March 19, 1999, and United States provisional application number 60/126,524 filed on March 26, 1999, both of which are incorporated herein by reference.

RELATED PATENT APPLICATIONS

The application is related to co-pending United States provisional application number 60/081,748 filed on April 14, 1998 and United States utility application number 09/190,727 filed on November 12, 1998, the disclosures of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to systems and methods for creating an electronic system and method for allowing consumers to make transactions. In addition, a financing system and method are described to support this electronic system and method of making transactions.

BACKGROUND OF THE INVENTION

The growth of the Internet has gone hand-in-hand with the growth of electronic commerce (e-commerce). Millions of people are making purchases of goods and services over the Internet. To facilitate these purchase, a plurality of payment schemes have been established. While these payment schemes have advantages, they all suffer from drawbacks as well.

Probably the most widely used system is the credit card. A consumer may use his/her credit card in one of two ways. The first is to enter the credit card number into the merchant's site. This operation is like using the credit card at a store. The merchant site, like the cashier's terminal at the store, accepts the number and requests authorization to allow the transaction. If the transaction is approved, the consumer receives the goods or services purchased. While this method of performing a transaction is acceptable, it also has drawbacks. The first is reduced security. Unless the Web browser is configured by the merchant site or by a plug-in to encrypt the credit card number, the consumer's credit card number is transmitted across the Internet in an unsecured fashion. This makes it possible for someone to intercept the messages and retrieve the credit card number.

It should also be noted that the transaction costs of purchasing inexpensive items using the above described credit card system are too prohibitive to be effective. Therefore, merchants of inexpensive goods and services cannot effectively use the Internet.

Another method of making purchases over the Internet uses what is called a notational system. This system relies on a third party to clear transactions. Both consumers and merchants register with this third party. The consumer buys tokens that are held in an electronic wallet. When the consumer purchases something from a merchant, a message is sent to the third party indicating that consumer X has forwarded Y tokens to merchant Z. The third party then reallocates funds from the consumer's account over to the merchant account. Whenever the

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merchant desires to liquidate its account, it does so and receives the money from the third party. The third party typically receives money from the customer via a credit card.

5 This form of electronic payment has as its advantages in that small increments of exchange are possible (i.e., less than \$1). By allowing a merchant to collect hundreds of 50 cent purchases, it becomes worth-while for the merchant to incur the transaction costs of the third party to liquidate the accumulated funds. Similarly, the consumer purchases a batch of tokens and incurs fees associated with buying the tokens. Therefore, spending the tokens on
10 inexpensive items dilutes the transaction costs over a larger pool of transactions.

Another form of electronic payment involves the use of digital bearer certificates. A consumer buys the digital bearer certificates and turns them over to the merchant when a purchase is made. In this scheme, the digital bearer certificates is like currency. Whoever is
15 in possession of the digital bearer certificate may exchange it for goods or services. When the merchant accepts the digital bearer certificates, it performs a check with the certificate issuer to be sure that the certificate has not been copied or previously redeemed. If the digital bearer certificate has not been previously redeemed, the merchant accepts the
20 certificate in exchange for the good or service.

The main problem with some digital bearer certificate systems is the limited acceptance of digital bearer certificates. If institution X issues a certificate to consumer Y and that consumer redeems his certificate with merchant Z, that merchant must go to institution X to
25 exchange that digital bearer certificate for money. If the merchant is a member of institution W, it is unlikely that the merchant will accept digital bearer certificates from institution X. Thus, the use of certain digital bearer certificates is not widespread amongst Internet merchants.

30 In addition to these shortcomings, neither form of electronic commerce is designed to handle large purchases like credit card accounts. Thus, merchants selling very expensive items over the Internet cannot reach those customers who limit themselves to only using electronic money.

35 Yet another shortcoming of conventional electronic money forms of payment is the reliance on storing the electronic money on the consumer's home PC. These systems require the consumer to be home using his/her PC in order to use the electronic money. In addition, once a digital bearer certificate is downloaded onto the consumer's PC, the risk of copying a single certificate for multiple purchases increases. This therefore requires enhanced security systems
40 to check the authenticity of the certificates.

Finally, downloading these certificates to the consumer's PC may take a long time. In addition, as these certificates are bought and used, constant updates by the financial
45 institution are required.

SUMMARY OF THE INVENTION

50 The present invention solves the above problems by providing a system and method a consumer may use to make purchases of various sizes without relying on forms of payment stored on a personal computer.

BRIEF DESCRIPTION OF THE DRAWINGS

55 The accompanying drawings, which are incorporated in and form a part of the specification,

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illustrate preferred embodiments of the present invention and, together with the description, disclose the principles of the invention.

5 Figure 1 is a diagram of a system according to an embodiment of the present invention.

 Figure 2 is a flowchart representative of a method in accordance with an embodiment of the present invention.

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 Figure 3 is an exemplary screen used in an embodiment of the present invention.

 Figure 4 is another exemplary screen used in an embodiment of the present invention.

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DETAILED DESCRIPTION OF THE DRAWINGS

20 Figure 1 shows a system for implementation of an embodiment of the present invention. Personal computer (PC) 100 includes a Web browser 100a and locally stored election currency 100b. Examples of Web browsers include Netscape's Navigator™ and Microsoft's Internet Explorer™. PC 100 typically is coupled to network 105 via a modem and an Internet Service
25 Provider (ISP) system (not shown). In a preferred embodiment, the network is a publicly accessible network such as the Internet. It should be noted that in alternative embodiments, the PC 100 is implemented using a Web television capable of interfacing with the Internet as well as various hand-held devices that support Web browsing like mobile telephones and personal
30 digital assistants (PDAs). In alternative embodiments, consumers may use an automatic teller machine (ATM) to access the electronic card account of the present invention.

 Also coupled to the network 105 is financial institutional computer 110, merchant server 115 and merchant store 120. Financial institutional computer 110 includes electronic card account
35 software 110a.

 As will be described in greater detail below, the consumer downloads a Web page advertising a good or service provided by a merchant. If the consumer wishes to buy that good or service, he/she uses the electronic card account 110a stored on financial server 110 in order to purchase
40 the advertised good or service.

 Figure 2 shows a process the present invention goes through when a consumer makes a purchase. At block B205, the consumer downloads a merchant Web page advertising a particular good or service from merchant computer 115 onto PC 100. At block B210, the
45 consumer accesses the electronic card account 110a stored on financial computer 110 from PC 100. By accessing electronic card account 110a, Web browser 100a receives the value of the electronic currency stored therein and not copies of the digital bearer certificates. The dashed arrows between blocks B205 and B210 indicate that the consumer may access the electronic
50 card account 110a first and download the merchant Web page second. In yet an alternative method of the present invention, the financial computer 110 acts as a portal to other Web sites such as those supported by merchant computer 115 when the consumer accesses electronic card account 110a.

55

 Regardless of the order of accessing electronic account 110a and downloading the merchant Web page, at block B215 Web browser 100a combines the two into a composite screen for

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viewing by the consumer. An example of such a screen is shown in Figure 3. At block B220, the consumer decides to either purchase the advertised good or service or not. If the consumer does not wish to purchase this particular good or service, or exits Web browser 100a, he/she clicks or enters another Universal Resource Locator (URL) at block B245.

If the consumer does wish to purchase the advertised good or service at block B220, he/she clicks on a button, like button 320, shown in Figure 3. The Web browser responds by displaying the various payment options available to the consumer as shown in Figure 4 at block B225. In a preferred embodiment of the present invention, this is accomplished by running a JAVA applet, or equivalent, that displays another Web page like the one shown in Figure 4. As shown in Figure 4, the payment options comprise three types. The first type 415a includes the payment options available from electronic card account 110a that are stored on financial server 110. The second type of payment option 415b is the use of a credit card. The third type of payment option 415c is the use of electronic money 110b stored on the hard drive or other local memory of PC 100.

At block B230, the consumer selects one of the displayed payment options. In response, a message is sent from PC 100 to merchant computer 115 indicating that the consumer wishes to purchase the advertised good or service.

If at block B230, the consumer selects a credit card account as the method of payment, merchant computer 115 receives the credit card number. Merchant computer 115 then obtains the necessary authorization for the credit card account at block B235. At block B240, merchant computer 115 sends a message back to PC 100 indicating that the purchase has been authorized and the process ends. After the consumer receives confirmation, the process goes to block B245, where the consumer may select another URL or close Web browser 110a.

If at block B230, the consumer selects electronic currency 100b stored locally on PC 100, Web browser 100a transmits a digital bearer certificate(s) to merchant server 115 at block B250. Merchant computer 115 authenticates the digital bearer certificate(s) at block B255 with the institution from which it was issued. In a preferred embodiment, this institution is the same as the institution supported by computer 110. At block B260, merchant computer 115 sends a message to PC 100 informing the consumer that the purchase was approved. The process continues at block B245, where the consumer may select another URL or close Web browser 100a.

If at block B230 the consumer selects use of electronic card account 110a stored on financial computer 110, Web browser 100a will forward a request to financial computer 110 to forward the appropriate digital bearer certificate(s) to the merchant computer 115 at block B265. When financial computer 110 receives this request, it authorizes the request and then forwards the digital bearer certificate(s) to merchant server 115 at block B270. At block B275, merchant site 115 sends confirmation of receipt of the digital bearer certificate(s) to financial computer 110 and a message to PC 100 informing the consumer that the purchase has been made. The process continues at block B245, where the consumer may select another URL or close Web browser 100a.

This method provides several advantages over other methods. First, the digital bearer certificates remain in the control of financial computer 110 until the purchase is made. This means that the security of the digital bearer certificates is enhanced because the consumer never receives them and cannot therefore make unauthorized copies. This leads into the second benefit of reduced time to process the transaction. In other types of electronic payment schemes, the consumer transmits the digital bearer certificates to merchant computer 115 and merchant

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computer 115 must authenticate with financial computer 110 that these digital bearer certificates are not copies or counterfeit certificates.

5 Another advantage of the present invention is the multiple payment forms available to the consumer. He/she may select among the available types (i.e., local digital bearer certificates, electronic card account digital bearer certificates or credit cards) to effect the payment.

10 Another advantage of having financial computer 110 maintain control over the digital bearer certificates is the increased security that allows merchants and third parties to offer incentive programs. As an example, suppose an airline company offers frequent flyer miles for those individuals who make purchases using the digital bearer certificates stored in electronic card account 110a. For every \$5 spent, the consumer will collect 1 frequent flyer mile. The
15 airline company will be confident that this incentive program is secure and that digital bearer certificates will not be copied/counterfeited because the financial computer 110 will maintain control over the digital bearer certificates.

20 In addition, the third party may change its incentive program when it wishes, without requiring the financial institution to reprogram financial computer 110. This is because financial computer 110 performs periodic batch dumping of data to the third party computer and the third party computer performs calculations to determine what each consumer receives in incentives. Thus, if the airline company wants to offer only one frequent flyer mile for every
25 \$10 spent, only the airline company's computer needs to be reprogrammed, and not the financial institution's.

30 Another method of purchasing goods and services using an embodiment of the present invention involves using computer terminal 120 located at the merchant's store. When the consumer has decided on whatever good(s) or service(s) he/she wishes to buy, the consumer brings them to a cashier's table equipped with a computer terminal. Either the consumer or a store employee enters the appropriate data set forth in the process shown in Figure 2 to effect payment for the good(s) or service(s).

35 This method of payment may be somewhat different if the consumer does not have a smart card or PDA with digital bearer certificates stored therein that can interface with a terminal at merchant store 120. If there is no "local" form of payment, the consumer will, by default, be
40 required to select the payment forms offered by electronic card account 110a stored on financial computer 110. This means that the consumer will be unable to go through blocks B250-B260 of Figure 2.

45 Financing

50 In a preferred embodiment of the present invention, the digital bearer certificates stored on financial computer 110 in electronic card account 110a are pre-purchased. In other words, the consumer buys five \$20 digital bearer certificates at one time. By accepting the money up front, the financial institution may invest it.

55 For example, suppose 900 customers add \$100 each to their respective cash portions of the electronic card accounts on January 1. On January 1, the financial institution is \$90,000 richer but also incurs the liability of paying out the money spent by those customers at merchant stores or merchant Web sites. The financial institution therefore has use of this \$90,000 until the various customers begin spending the money at various merchant stores and Web sites.

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In the aggregate, most customers will not spend any portion of the \$100 added to the electronic card account immediately. As an example, assume one-third spend a portion of the \$100 within 5 days, another third will spend the money about 2 weeks after adding it to electronic card account 110a and the last third won't spend the money until about 4 weeks after adding it to the electronic card account 110a.

The financial institution is required to pay out the value of the redeemed digital bearer certificate when requested to do so by a merchant seeking indemnification. Using the averages above, the financial institution must keep \$30,000 in liquid assets so as to be able to indemnify those merchants who have goods or services purchased from them by consumers who have spent portions of their electronic cash within 5 days of depositing it. However, for the other groups of consumers, the financial institution may invest the other \$60,000 as long as the principal is returned with 15 and 30 days, respectively. If the financial institution buys a 30 day bond, the principal will be returned the day that bond matures and the financial institution will keep the interest earned. Thus, by having consumers buy the digital bearer certificates up front and store them on their respective electronic card accounts described above, a financial institution gains the use and investing benefits of that money.

Claims

1. A method of purchasing goods and services comprising:

receiving a request to transmit a digital bearer certificate at a computer controlled by an institution; and

transmitting the digital bearer certificate to a destination.

2. A method of paying for a good or service comprising:

providing a plurality of payment choices to a consumer;

receiving a selection of one of the plurality of payment choices; and

forwarding first data indicative of the one of the plurality of payment choices.

3. The method of claim 2, wherein the plurality of payment choices comprises:

a credit card account; and

a digital bearer certificate.

4. The method of claim 2 further comprising:

forwarding second data indicative of an amount of the one of the plurality of payment

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choices.

5 **5.** A method of financing an electronic form of payment comprising:

receiving money in exchange for issuing a digital bearer certificate;

10 investing the received money; and

either retaining enough liquid assets to indemnify the digital bearer certificate or
receiving a return from an investment to indemnify the digital bearer certificate.

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Figure 1

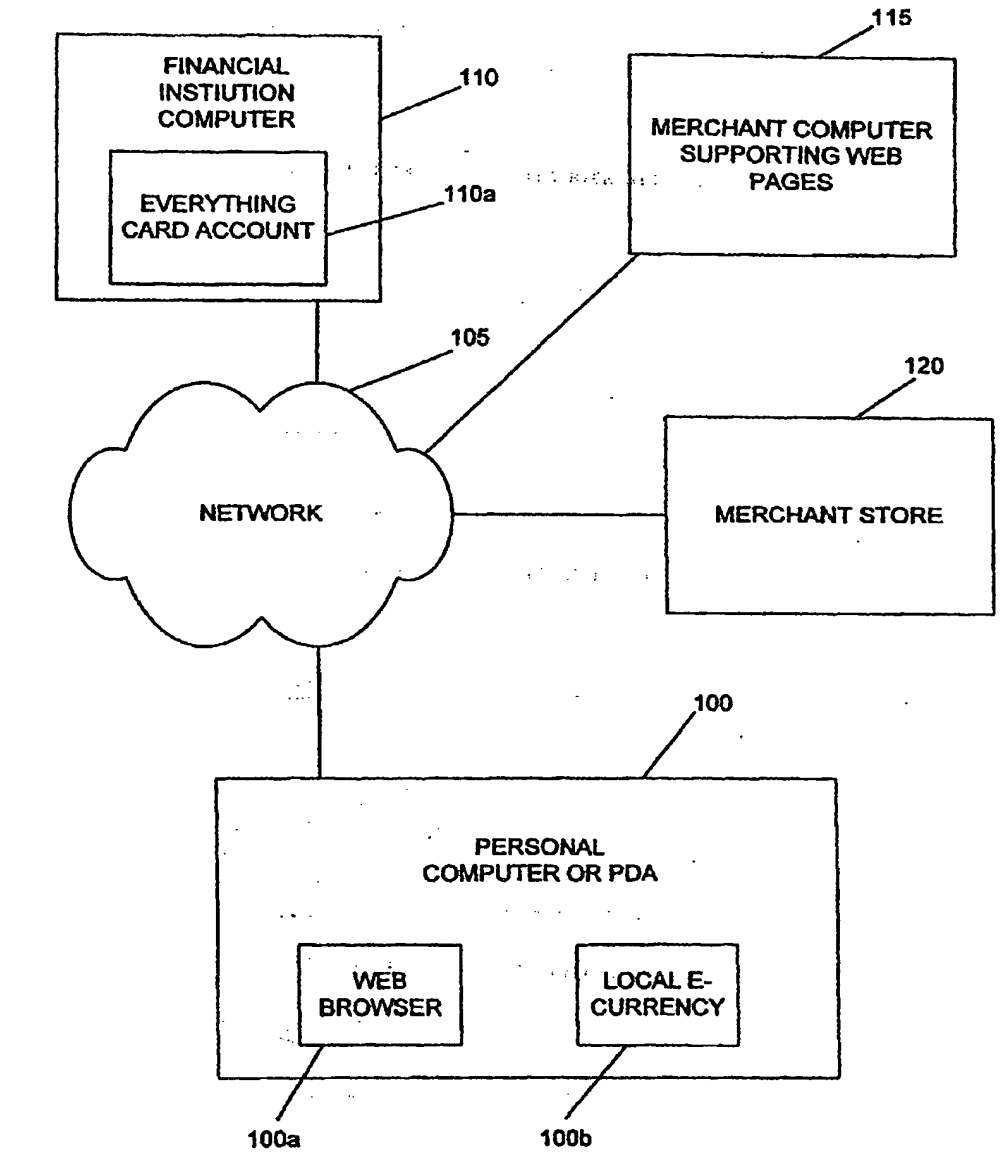


Figure 2

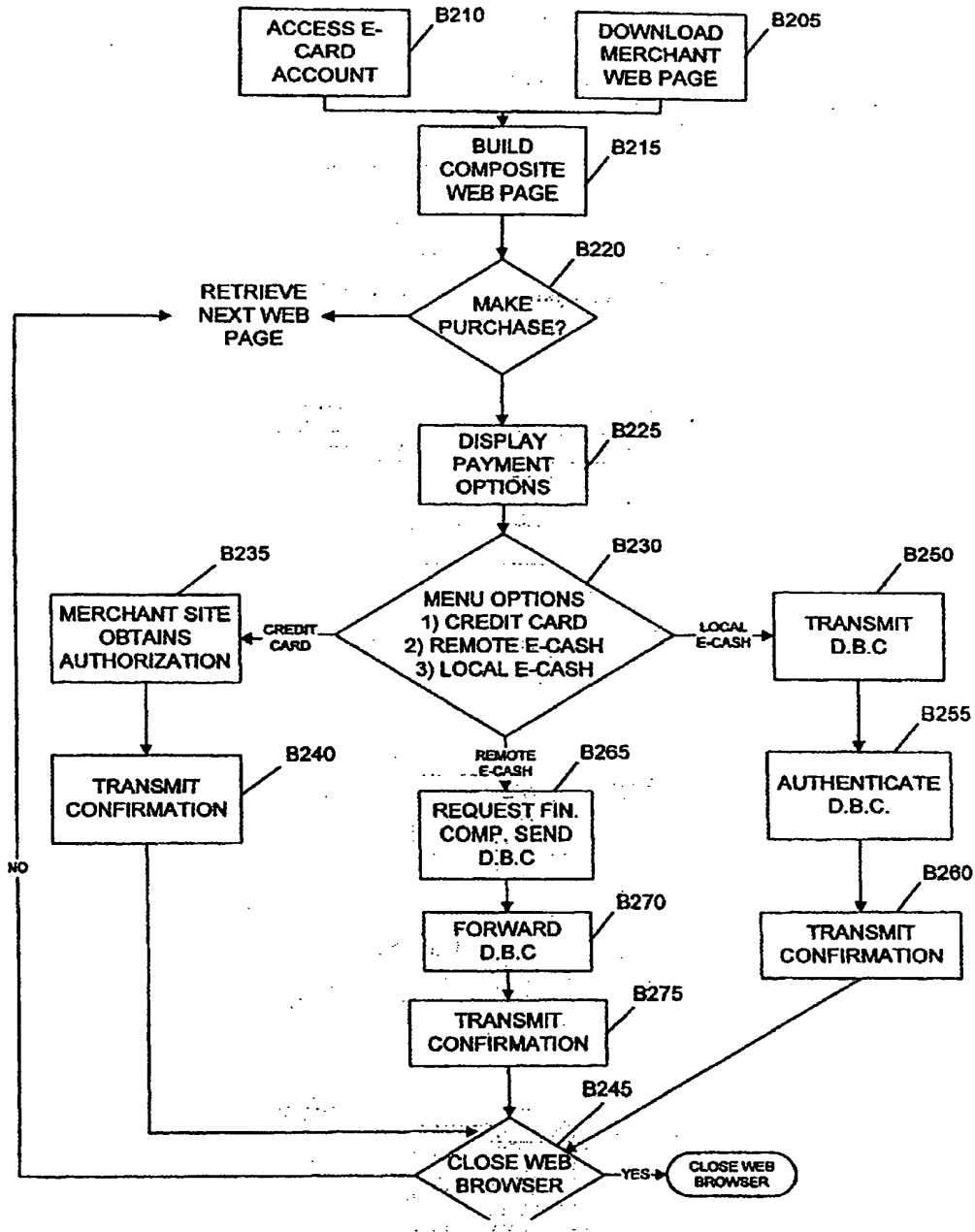


Figure 3

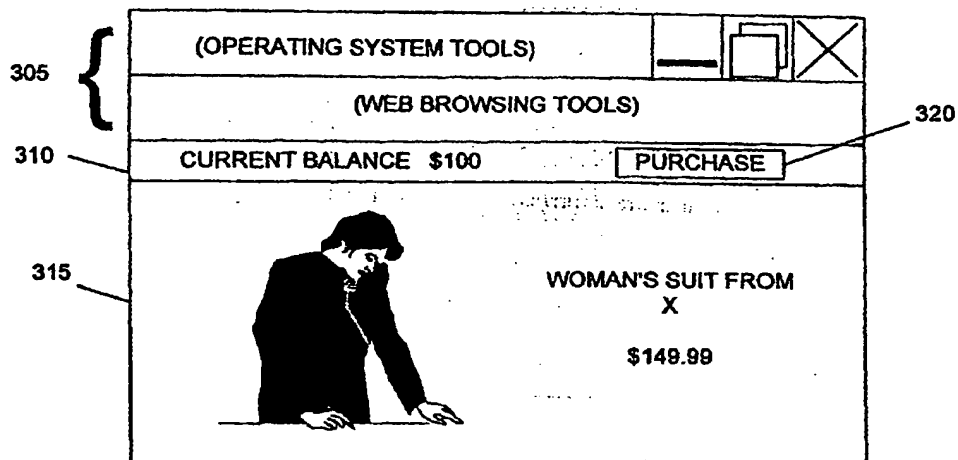
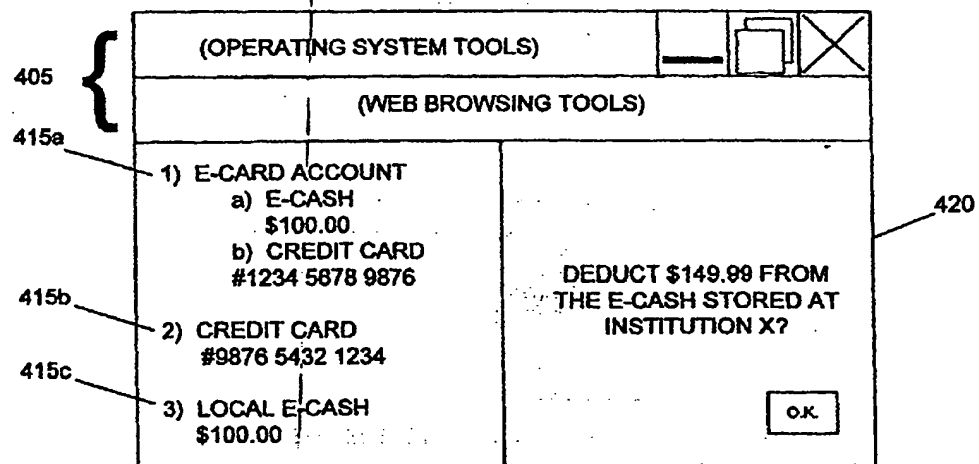
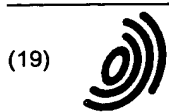


Figure 4





Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 039 402 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.09.2000 Bulletin 2000/39

(51) Int. Cl.⁷: **G06F 17/60**

(21) Application number: **00200960.3**

(22) Date of filing: **17.03.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

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Remarks:

A request for correction of the description (change of the cited priority number 09/190727 into 09/190993) has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(30) Priority: **19.03.1999 US 125155 P**
26.03.1999 US 126524 P

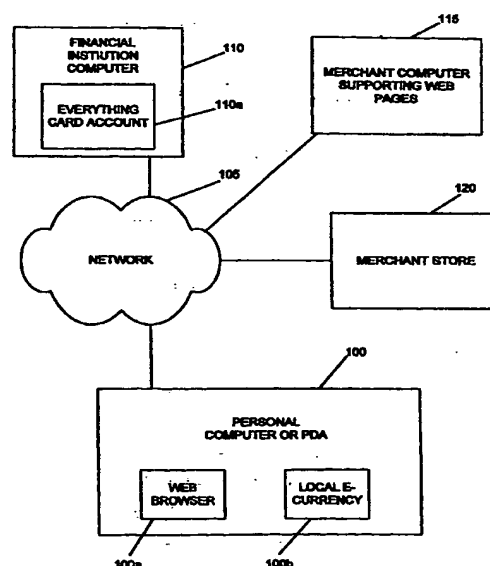
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(54) **Systems and methods of electronic payment and financing the same**

(57) A system and method are described wherein a financial institution establishes an electronic card account on its own computer. The financial institution issues digital bearer certificates to a consumer for use in making purchases over a network. The digital bearer certificates are stored on a financial institution's computer until the consumer instructs the computer to forward one to a merchant when purchasing a good or service. In addition to maintaining these digital bearer certificates, the electronic card account also holds credit card numbers for use in making purchases over the network. Finally, the financial institution receives money for the digital bearer certificates up front so that it may invest that money for profit.

Figure 1



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Description

CONTINUING DATA

[0001] This application claims priority to United States provisional application number 60/125,155 filed on March 19, 1999, and United States provisional application number 60/126,524 filed on March 26, 1999, both of which are incorporated herein by reference.

RELATED PATENT APPLICATIONS

[0002] The application is related to co-pending United States provisional application number 60/081,748 filed on April 14, 1998 and United States utility application number 09/190,727 filed on November 12, 1998, the disclosures of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0003] The present invention relates to systems and methods for creating an electronic system and method for allowing consumers to make transactions. In addition, a financing system and method are described to support this electronic system and method of making transactions.

BACKGROUND OF THE INVENTION

[0004] The growth of the Internet has gone hand-in-hand with the growth of electronic commerce (e-commerce). Millions of people are making purchases of goods and services over the Internet. To facilitate these purchases, a plurality of payment schemes have been established. While these payment schemes have advantages, they all suffer from drawbacks as well.

[0005] Probably the most widely used system is the credit card. A consumer may use his/her credit card in one of two ways. The first is to enter the credit card number into the merchant's site. This operation is like using the credit card at a store. The merchant site, like the cashier's terminal at the store, accepts the number and requests authorization to allow the transaction. If the transaction is approved, the consumer receives the goods or services purchased. While this method of performing a transaction is acceptable, it also has drawbacks. The first is reduced security. Unless the Web browser is configured by the merchant site or by a plug-in to encrypt the credit card number, the consumer's credit card number is transmitted across the Internet in an unsecured fashion. This makes it possible for someone to intercept the messages and retrieve the credit card number.

[0006] It should also be noted that the transaction costs of purchasing inexpensive items using the above described credit card system are too prohibitive to be effective. Therefore, merchants of inexpensive goods

and services cannot effectively use the Internet.

[0007] Another method of making purchases over the Internet uses what is called a notational system. This system relies on a third party to clear transactions. Both consumers and merchants register with this third party. The consumer buys tokens that are held in an electronic wallet. When the consumer purchases something from a merchant, a message is sent to the third party indicating that consumer X has forwarded Y tokens to merchant Z. The third party then reallocates funds from the consumer's account over to the merchant account. Whenever the merchant desires to liquidate its account, it does so and receives the money from the third party. The third party typically receives money from the customer via a credit card.

[0008] This form of electronic payment has as its advantages in that small increments of exchange are possible (i.e., less than \$1). By allowing a merchant to collect hundreds of 50 cent purchases, it becomes worth-while for the merchant to incur the transaction costs of the third party to liquidate the accumulated funds. Similarly, the consumer purchases a batch of tokens and incurs fees associated with buying the tokens. Therefore, spending the tokens on inexpensive items dilutes the transaction costs over a larger pool of transactions.

[0009] Another form of electronic payment involves the use of digital bearer certificates. A consumer buys the digital bearer certificates and turns them over to the merchant when a purchase is made. Is this scheme, the digital bearer certificates is like currency. Whoever is in possession of the digital bearer certificate may exchange it for goods or services. When the merchant accepts the digital bearer certificates, it performs a check with the certificate issuer to be sure that the certificate has not been copied or previously redeemed. If the digital bearer certificate has not been previously redeemed, the merchant accepts the certificate in exchange for the good or service.

[0010] The main problem with some digital bearer certificate systems is the limited acceptance of digital bearer certificates. If institution X issues a certificate to consumer Y and that consumer redeems his certificate with merchant Z, that merchant must go to institution X to exchange that digital bearer certificate for money. If the merchant is a member of institution W, it is unlikely that the merchant will accept digital bearer certificates from institution X. Thus, the use of certain digital bearer certificates is not widespread amongst Internet merchants.

[0011] In addition to these shortcomings, neither form of electronic commerce is designed to handle large purchases like credit card accounts. Thus, merchants selling very expensive items over the Internet cannot reach those customers who limit themselves to only using electronic money.

[0012] Yet another shortcoming of conventional electronic money forms of payment is the reliance on

storing the electronic money on the consumer's home PC. These systems require the consumer to be home using his/her PC in order to use the electronic money. In addition, once a digital bearer certificate is downloaded onto the consumer's PC, the risk of copying a single certificate for multiple purchases increases. This therefore requires enhanced security systems to check the authenticity of the certificates.

[0013] Finally, downloading these certificates to the consumer's PC may take a long time. In addition, as these certificates are bought and used, constant updates by the financial institution are required.

SUMMARY OF THE INVENTION

[0014] The present invention solves the above problems by providing a system and method a consumer may use to make purchases of various sizes without relying on forms of payment stored on a personal computer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The accompanying drawings, which are incorporated in and form a part of the specification, illustrate preferred embodiments of the present invention and, together with the description, disclose the principles of the invention.

Figure 1 is a diagram of a system according to an embodiment of the present invention.

Figure 2 is a flowchart representative of a method in accordance with an embodiment of the present invention.

Figure 3 is an exemplary screen used in an embodiment of the present invention.

Figure 4 is another exemplary screen used in an embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0016] Figure 1 shows a system for implementation of an embodiment of the present invention. Personal computer (PC) 100 includes a Web browser 100a and locally stored electronic currency 100b. Examples of Web browsers include Netscape's Navigator™ and Microsoft's Internet Explorer™. PC 100 typically is coupled to network 105 via a modem and an Internet Service Provider (ISP) system (not shown). In a preferred embodiment, the network is a publicly accessible network such as the Internet. It should be noted that in alternative embodiments, the PC 100 is implemented using a Web television capable of interfacing with the Internet as well as various hand-held devices that support Web browsing like mobile telephones and personal digital assist-

ants (PDAs). In alternative embodiments, consumers may use an automatic teller machine (ATM) to access the electronic card account of the present invention.

[0017] Also coupled to the network 105 is financial institutional computer 110, merchant server 115 and merchant store 120. Financial institutional computer 110 includes electronic card account software 110a.

[0018] As will be described in greater detail below, the consumer downloads a Web page advertising a good or service provided by a merchant. If the consumer wishes to buy that good or service, he/she uses the electronic card account 110a stored on financial server 110 in order to purchase the advertised good or service.

[0019] Figure 2 shows a process the present invention goes through when a consumer makes a purchase. At block B205, the consumer downloads a merchant Web page advertising a particular good or service from merchant computer 115 onto PC 100. At block B210, the consumer accesses the electronic card account 110a stored on financial computer 110 from PC 100. By accessing electronic card account 110a, Web browser 100a receives the value of the electronic currency stored therein and not copies of the digital bearer certificates. The dashed arrows between blocks B205 and B210 indicate that the consumer may access the electronic card account 110a first and download the merchant Web page second. In yet an alternative method of the present invention, the financial computer 110 acts as a portal to other Web sites such as those supported by merchant computer 115 when the consumer accesses electronic card account 110a.

[0020] Regardless of the order of accessing electronic account 110a and downloading the merchant Web page, at block B215 Web browser 100a combines the two into a composite screen for viewing by the consumer. An example of such a screen is shown in Figure 3. At block B220, the consumer decides to either purchase the advertised good or service or not. If the consumer does not wish to purchase this particular good or service, or exits Web browser 100a, he/she clicks or enters another Universal Resource Locator (URL) at block B245.

[0021] If the consumer does wish to purchase the advertised good or service at block B220, he/she clicks on a button, like button 320, shown in Figure 3. The Web browser responds by displaying the various payment options available to the consumer as shown in Figure 4 at block B225. In a preferred embodiment of the present invention, this is accomplished by running a JAVA applet, or equivalent, that displays another Web page like the one shown in Figure 4. As shown in Figure 4, the payment options comprise three types. The first type 415a includes the payment options available from electronic card account 110a that are stored on financial server 110. The second type of payment option 415b is the use of a credit card. The third type of payment option 415c is the use of electronic money 110b stored

on the hard drive or other local memory of PC 100.

[0022] At block B230, the consumer selects one of the displayed payment options. In response, a message is sent from PC 100 to merchant computer 115 indicating that the consumer wishes to purchase the advertised good or service.

[0023] If at block B230, the consumer selects a credit card account as the method of payment, merchant computer 115 receives the credit card number. Merchant computer 115 then obtains the necessary authorization for the credit card account at block B235. At block B240, merchant computer 115 sends a message back to PC 100 indicating that the purchase has been authorized and the process ends. After the consumer receives confirmation, the process goes to block B245, where the consumer may select another URL or close Web browser 110a.

[0024] If at block B230, the consumer selects electronic currency 100b stored locally on PC 100, Web browser 100a transmits a digital bearer certificate(s) to merchant computer 115 at block B250. Merchant computer 115 authenticates the digital bearer certificate(s) at block B255 with the institution from which it was issued. In a preferred embodiment, this institution is the same as the institution supported by computer 110. At block B260, merchant computer 115 sends a message to PC 100 informing the consumer that the purchase was approved. The process continues at block B245, where the consumer may select another URL or close Web browser 100a.

[0025] If at block B230 the consumer selects use of electronic card account 110a stored on financial computer 110, Web browser 100a will forward a request to financial computer 110 to forward the appropriate digital bearer certificate(s) to the merchant computer 115 at block B265. When financial computer 110 receives this request, it authorizes the request and then forwards the digital bearer certificate(s) to merchant server 115 at block B270. At block B275, merchant site 115 sends confirmation of receipt of the digital bearer certificate(s) to financial computer 110 and a message to PC 100 informing the consumer that the purchase has been made. The process continues at block B245, where the consumer may select another URL or close Web browser 100a.

[0026] This method provides several advantages over other methods. First, the digital bearer certificates remain in the control of financial computer 110 until the purchase is made. This means that the security of the digital bearer certificates is enhanced because the consumer never receives them and cannot therefore make unauthorized copies. This leads into the second benefit of reduced time to process the transaction. In other types of electronic payment schemes, the consumer transmits the digital bearer certificates to merchant computer 115 and merchant computer 115 must authenticate with financial computer 110 that these digital bearer certificates are not copies or counterfeit cer-

tificates.

[0027] Another advantage of the present invention is the multiple payment forms available to the consumer. He/she may select among the available types (i.e., local digital bearer certificates, electronic card account digital bearer certificates or credit cards) to effect the payment.

[0028] Another advantage of having financial computer 110 maintain control over the digital bearer certificates is the increased security that allows merchants and third parties to offer incentive programs. As an example, suppose an airline company offers frequent flyer miles for those individuals who make purchases using the digital bearer certificates stored in electronic card account 110a. For every \$5 spent, the consumer will collect 1 frequent flyer mile. The airline company will be confident that this incentive program is secure and that digital bearer certificates will not be copied/counterfeited because the financial computer 110 will maintain control over the digital bearer certificates.

[0029] In addition, the third party may change its incentive program when it wishes, without requiring the financial institution to reprogram financial computer 110. This is because financial computer 110 performs periodic batch dumping of data to the third party computer and the third party computer performs calculations to determine what each consumer receives in incentives. Thus, if the airline company wants to offer only one frequent flyer mile for every \$10 spent, only the airline company's computer needs to be reprogrammed, and not the financial institution's.

[0030] Another method of purchasing goods and services using an embodiment of the present invention involves using computer terminal 120 located at the merchant's store. When the consumer has decided on whatever good(s) or service(s) he/she wishes to buy, the consumer brings them to a cashier's table equipped with a computer terminal. Either the consumer or a store employee enters the appropriate data set forth in the process shown in Figure 2 to effect payment for the good(s) or service(s).

[0031] This method of payment may be somewhat different if the consumer does not have a smart card or PDA with digital bearer certificates stored therein that can interface with a terminal at merchant store 120. If there is no "local" form of payment, the consumer will, by default, be required to select the payment forms offered by electronic card account 110a stored on financial computer 110. This means that the consumer will be unable to go through blocks B250-B260 of Figure 2.

Financing

[0032] In a preferred embodiment of the present invention, the digital bearer certificates stored on financial computer 110 in electronic card account 110a are pre-purchased. In other words, the consumer buys five \$20 digital bearer certificates at one time. By accepting the money up front, the financial institution may invest it.

[0033] For example, suppose 900 customers add \$100 each to their respective cash portions of the electronic card accounts on January 1. On January 1, the financial institution is \$90,000 richer but also incurs the liability of paying out the money spent by those customers at merchant stores or merchant Web sites. The financial institution therefore has use of this \$90,000 until the various customers begin spending the money at various merchant stores and Web sites.

[0034] In the aggregate, most customers will not spend any portion of the \$100 added to the electronic card account immediately. As an example, assume one-third spend a portion of the \$100 within 5 days, another third will spend the money about 2 weeks after adding it to electronic card account 110a and the last third won't spend the money until about 4 weeks after adding it to the electronic card account 110a.

[0035] The financial institution is required to pay out the value of the redeemed digital bearer certificate when requested to do so by a merchant seeking indemnification. Using the averages above, the financial institution must keep \$30,000 in liquid assets so as to be able to indemnify those merchants who have goods or services purchased from them by consumers who have spent portions of their electronic cash within 5 days of depositing it. However, for the other groups of consumers, the financial institution may invest the other \$60,000 as long as the principal is returned with 15 and 30 days, respectively. If the financial institution buys a 30 day bond, the principal will be returned the day that bond matures and the financial institution will keep the interest earned. Thus, by having consumers buy the digital bearer certificates up front and store them on their respective electronic card accounts described above, a financial institution gains the use and investing benefits of that money.

Claims

1. A method of purchasing goods and services comprising:

receiving a request to transmit a digital bearer certificate at a computer controlled by an institution; and

transmitting the digital bearer certificate to a destination.

2. A method of paying for a good or service comprising:

providing a plurality of payment choices to a consumer;

receiving a selection of one of the plurality of payment choices; and

forwarding first data indicative of the one of the plurality of payment choices.

3. The method of claim 2, wherein the plurality of payment choices comprises:

a credit card account; and

a digital bearer certificate.

4. The method of claim 2 further comprising:

forwarding second data indicative of an amount of the one of the plurality of payment choices.

5. A method of financing an electronic form of payment comprising:

receiving money in exchange for issuing a digital bearer certificate;

investing the received money; and

either retaining enough liquid assets to indemnify the digital bearer certificate or receiving a return from an investment to indemnify the digital bearer certificate.

Figure 1

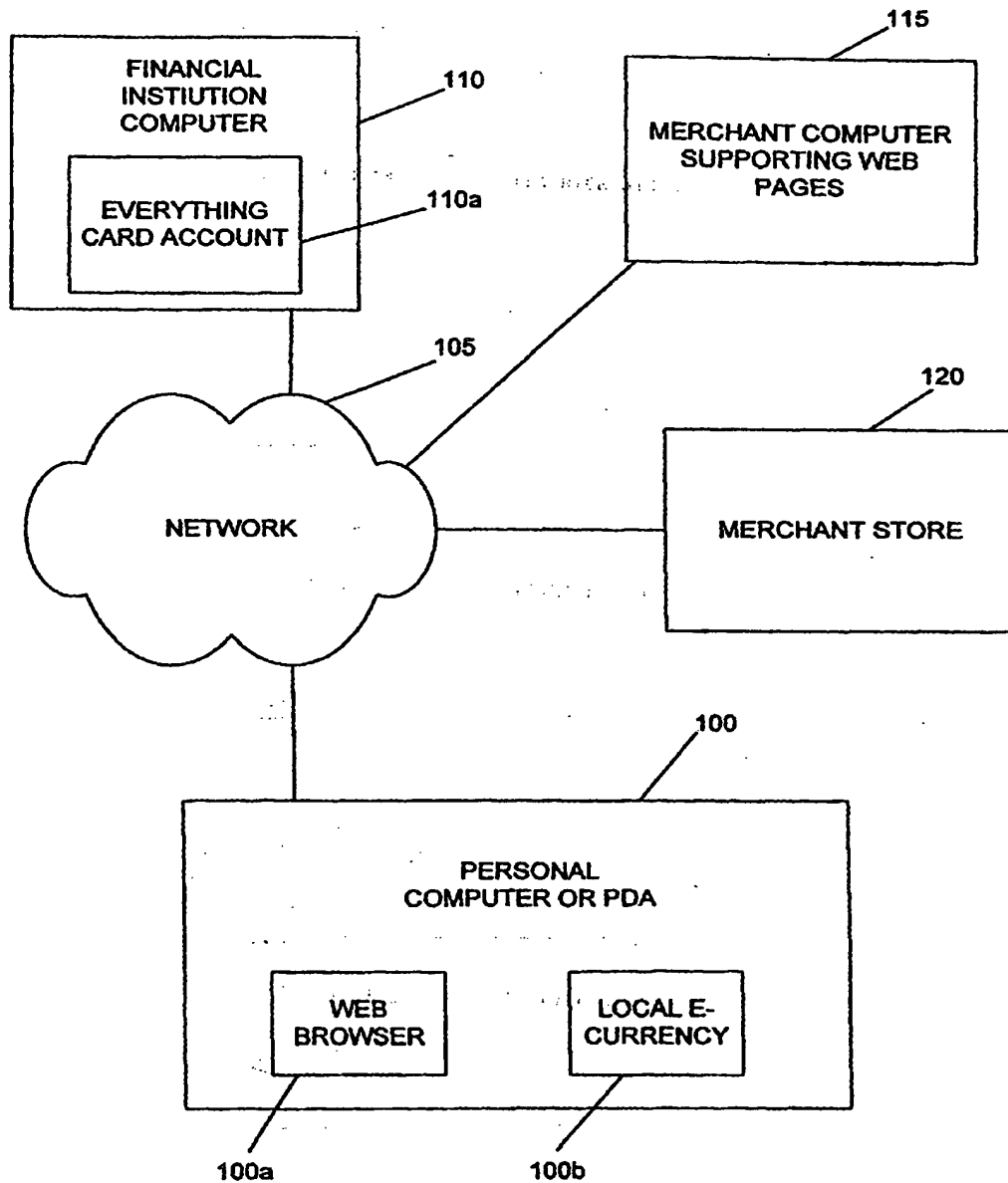


Figure 2

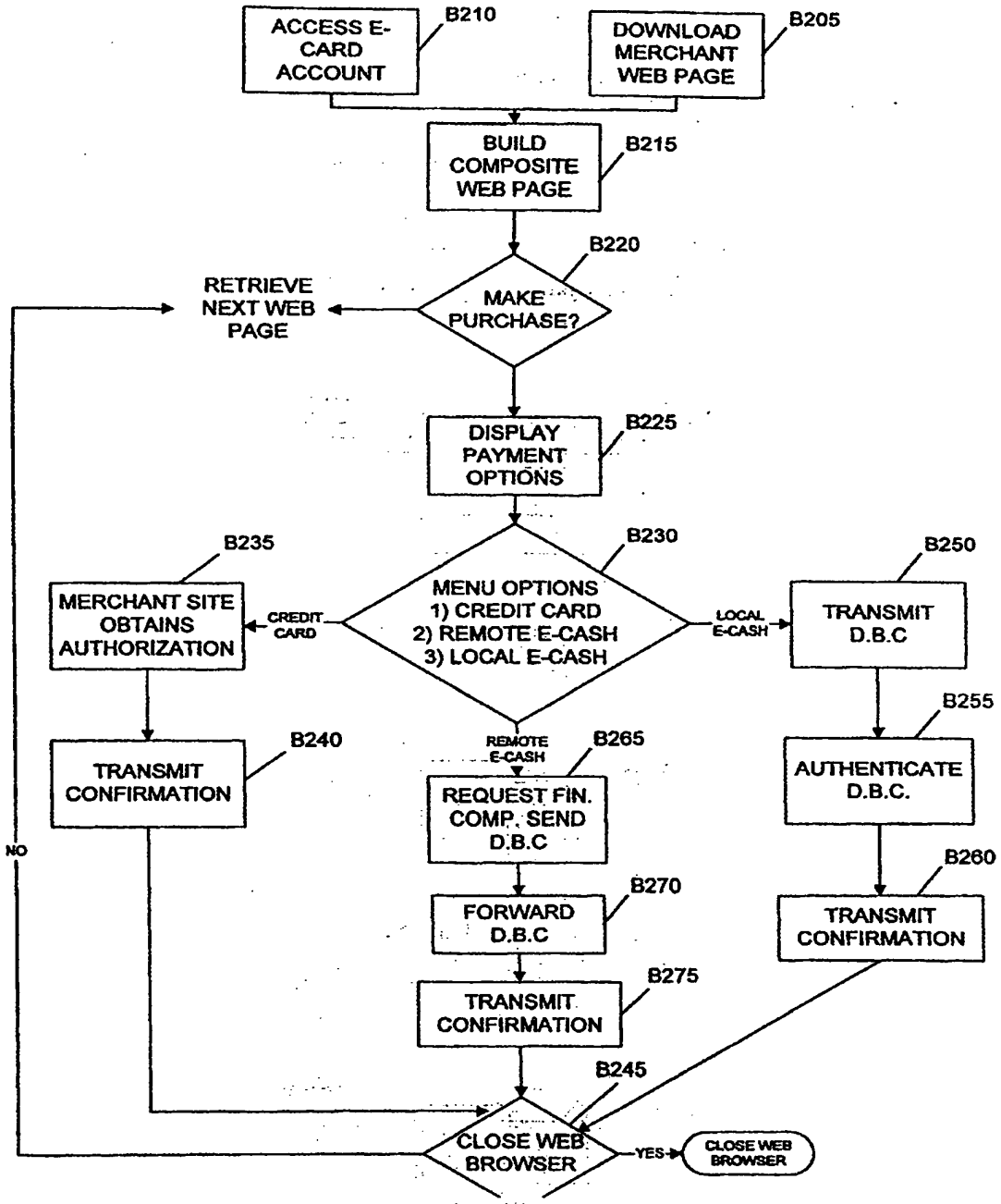


Figure 3

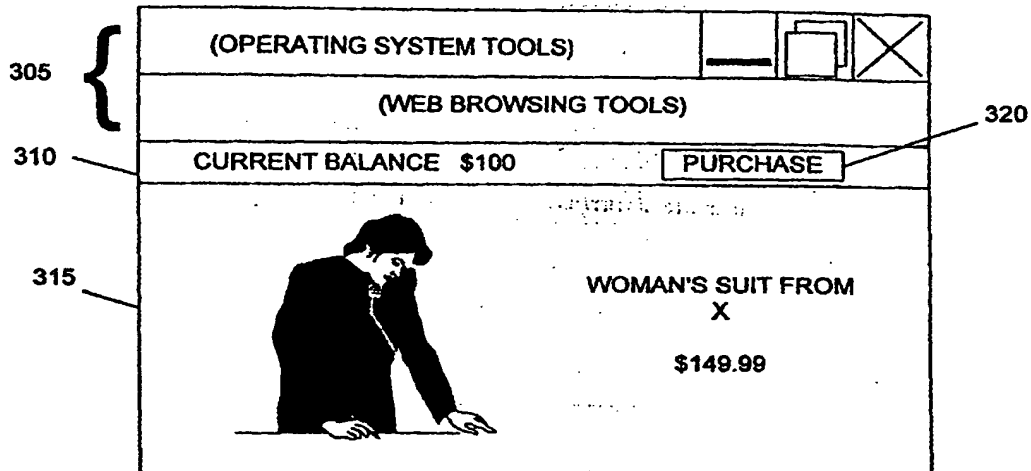
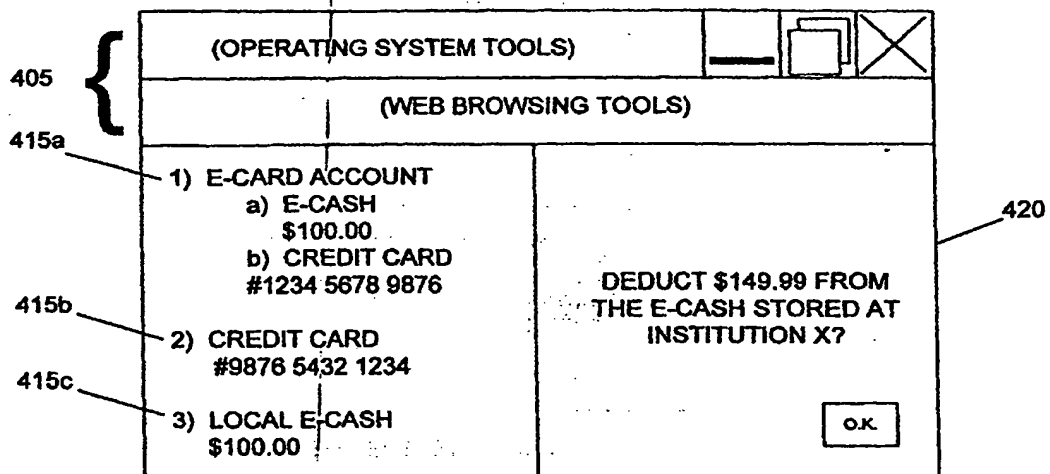


Figure 4



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 March 2001 (08.03.2001)

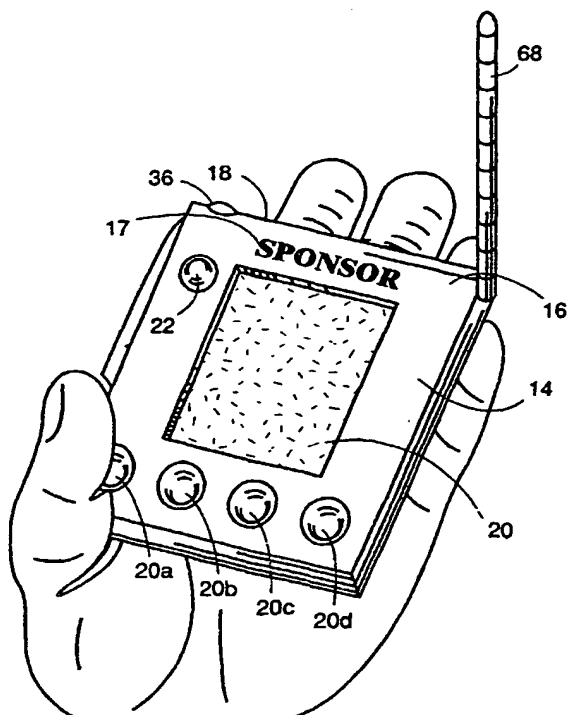
PCT

(10) International Publication Number
WO 01/17262 A1

- (51) International Patent Classification: **H04N 7/173** (72) Inventors; and
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- (21) International Application Number: **PCT/US00/24386**
- (22) International Filing Date: **31 August 2000 (31.08.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English** (74) Agent: **GILSTER, Peter, S.**; Greensfelder, Hemker & Gale, P.C., 10 South Broadway, Suite 2000, St. Louis, MO 63102 (US).
- (30) Priority Data:
60/151,840 1 September 1999 (01.09.1999) US
09/489,373 21 January 2000 (21.01.2000) US
60/195,542 7 April 2000 (07.04.2000) US
60/207,460 25 May 2000 (25.05.2000) US
- (81) Designated States (national): **AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.**
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[Continued on next page]

(54) Title: **PROMOTIONAL HAND-HELD COMMUNICATION DEVICES**



(57) Abstract: A system for deriving benefits from the reception and processing of composite video signals from a display device by a hand-held device (12), such as a smart card, personal digital assistant ("PDA") or mobile phone. Video signals are modulated with auxiliary data creating composite video signals. The users directs the hand-held device (12) toward the display device by placing leading edge (18) in the path of the video signal. The composite video signals are then transmitted to and received by a hand-held device (12) that auxiliary data is being received. The auxiliary data is then utilized by hand-held device (12). Aiming light and/or audio transducer alert the user of hand-held device (12) that auxiliary data is being received. The auxiliary data is then utilized by hand-held device (12).

WO 01/17262 A1



(84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— With international search report.

— Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

**PROMOTIONAL HAND-HELD
COMMUNICATION DEVICES**

Cross-Reference to Related Application

This application is based upon United States Provisional Patent Application entitled "Interactive
5 Cards and Other Hand-Held Devices for Receiving Veiled Optical Data and Other Signals", Serial No.: US 60/151,840, Filed 1 September, 1999 by Edward J. Koplar, United States Utility Patent Application entitled
"Interactive Optical Cards and Other Hand-Held Devices
10 with Increased Connectivity", Serial No.: US 09/489,373, Filed January 21, 2000 by Edward J. Koplar and Daniel A. Ciardullo, United States Provisional Patent Application entitled "Interactive Hand-Held Promotional Communication Devices", Serial No.: US 60/195,542, Filed April 7, 2000
15 by Edward J. Koplar and Daniel A. Ciardullo, and United States Provisional Patent Application entitled "Method and Hardware for Redemption of a Multi-use Smart Card", Serial No.: US 60/207,460, Filed May 25, 2000 by Daniel A. Ciardullo and Jim G. Withers all of which are herein
20 incorporated by reference and continued preservation of which is requested.

Background of the Invention

25 The present invention relates to interactive hand-held devices, and more particularly to methods and apparatuses for receiving and decoding modulated signals, for use by a hand-held devices and receiving benefits from receptions of the signals.

30 The hand-held device of the present invention receive modulated video signals for purposes including enjoyment, promotion, transfer of information, data

collection, commercial verification, security, education, and transactions or verifications at points of sale, as well as other commercial, personal, entertainment, or amusement purposes. Data may be sent to the hand-held
5 device by optical or electrical means. Data may be received by the hand-held device by utilizing a sleeve, cradle, or docking station; through an optical lens, by use of a PCMCIA or alternate computer port, or by FM, AM, or other radio frequency means. Use of the device may
10 allow users to receive, process, and/or store other information and promotional opportunities including access to hotel rooms and facilities and interaction in a movie theater.

U.S. Patent 4,807,031 Broughton et al. ("Broughton")
15 titled "Interactive Video Method and Apparatus" relates generally to in-band video broadcasting of commands and other encoded information to interactive devices. The invention described therein relates generally to interactive educational and entertainment systems, and is
20 described in one embodiment in the context of television program control of toys located where there is a television receiver, as within a residence.

To encode control data capable of providing a benefit to a user, Broughton discloses a novel method of
25 luminance or chrominance modulation of a video signal that creates a composite video signal, whereby the control data is created by modulating the video signal. The novel modulation method alternately raises and lowers the luminance/chrominance of adjacent horizontal scan
30 lines to create a video subcarrier that contains the control data.

Under Broughton, the video signal is not being replaced with other data, nor is the data being added as a separate signal along with the video signal, rather,
35 the video signal itself is modulated to subsequently create the control data. Therefore, the control data is a part of, or contained within, the video signal. The

encoding method also includes preview and remove circuitry to ensure suitability or the presence of data encoding and removal of data encoding, respectively.

The control data is transmitted either by television
5 broadcast means, or by pre-recorded video players that are connected to a video display. The control data is then received by the video display where a video field of the video display is modulated by control (i.e. auxiliary) data. The control data is then detected with
10 either opto-electronic or RF (radio frequency) detection means that discriminate the program material from the control data. The detected control data is further reproduced such that the control data can be used with an interactive device.

15 A practical example of a device as described above is the commercially-sold hand-held game device for receiving and detecting such control data has been called the "Wheel of Fortune" ITV Play-Along Game, intended to be used at while viewing a television program
20 presentation of the famous television show of the same name. The device, produced under license by the assignee of Broughton, was a palm-sized device and included a photosensor within a case of the device that received the video signals. The device then discriminated control
25 data from the video program material and caused a liquid crystal display ("LCD") on the face panel of the toy to present portions of a word puzzle, allowing the holder of the device to play the game along with a contestant or to play in response to a videotaped presentation of the
30 game. The "Wheel of Fortune" interactive television (ITV) game together with its hand-held control device including keyboard was commercially available in 1988.

An improvement on the method of modulation described in Broughton is described in U.S. Patent 6,094,228. In
35 Ciardullo et al. ("Ciardullo") improved methods of modulation are disclosed. Data is inserted on the visual portion of a video signal by changing the luminance of

paired lines in opposite directions, thus allowing allow larger amounts of data to be modulated in a signal. Broughton and Ciardullo are both incorporated by reference herein.

5 Efforts by others to provide hand-held devices capable of receiving transmission of modulated data from a video display are represented by U.S. Patents 5,594,493; 5,761,601; 5,767,896, 5,907,350, and 5,953,047. Of these, patent 5,907,350 discloses a method
10 for storing data on a so-called smart card, which is contended to receive, decode and store encoded data signals comprising redeemable coupons said to be embedded within television segments and transmitted along with normal television segments. The device of Patent
15 5,907,350 is a hand-held unit that receives luminance signals from the television display in accordance with the principles of Broughton. The received video signals are decoded and stored within the card for future use. An LCD readout enables Universal Price Codes ("UPC")
20 corresponding to the stored data. A scanner reads the UPC codes at a redemption site, and the stored coupon is then erased from a memory of the card. A microprocessor channels the decoding and storage aspects, and a keypad allows use and input.

25 The term "smart card" as used in the above patents, connotes a hand-held, portable device, not conceptually different from the above-mentioned "Wheel of Fortune" ITV game device. However, the term does not only apply to those patents.

30 As a generic term, "smart card" gradually has come to mean a card that looks like a credit card but includes a microchip or microprocessor embedded or incorporated into the card. The smart card may be referred to as a "fingerheld" computer, typically including a data storage
35 media ranging from less than a kilobyte up to a megabyte (if not more), and are said to have originated in France. Ognibene, P.J., "Card Smarts," Technology Decisions

(July, 1999). Smart cards may, according to a line of reference, also be called "chip cards."

While the hand-held devices of the present invention may be in the form of a smart card, they may
5 alternatively be in the form of mobile phones. Recently, mobile phones have become equipped with increased capacity to store and process information and many such phones are now offering limited network or Internet access, often called wireless Internet access. Industry
10 experts estimate that by 2002, more than 100 million mobile phones will have Internet access in some fashion and that by 2003, more than 1 billion mobile phones will be in use worldwide. Such mobile phones, with or without Internet access, become powerful promotional tools when
15 appropriately modified or connected to receive auxiliary data.

The personal digital assistants ("PDAs") are another hand-held device capable of providing users with promotional opportunities. The most popular brand, Palm
20 Pilot, introduced its first PDA in 1996. The latest Palm Pilot introduced in 1999, Palm VII, was the first PDA to include wireless Internet access.

PDAs and mobile phones, while capable of Internet access, as of the time of this invention have limited
25 functionality as a result of slow transfers of data and limited displays. It is thus desirable to provide users of such devices and similar devices such as smart cards interactive opportunities that are compact in size yet rich in content to encourage users to participate in
30 various promotional opportunities without having prolonged delays in receipt and processing of information. It will be appreciated that under the present invention, that the smart card, mobile phone, and PDA are all capable of providing the promotional
35 opportunities described in the present application.

Hand-held devices that receive optically encoded data from a display device can be efficiently utilized at

a POS without the need to scan a UPC code that is displayed, for example, on an LCD. The hand-held devices and methods may not require additional hardware or software at the POS and must be capable of providing a high degree of security. Additionally, check-out time must not be seriously degraded and multiple promotional opportunities or coupons must be redeemable.

For purposes of the present invention, the term "card" means an interactive device of portable character, preferably of hand-held type which may be carried in the palm by a user, between fingers of the user, or is otherwise intended to be easily grasped and handled manually by the user, including credit card-like devices.

To the extent that they are used in the present description relative only to inventions herein disclosed and/or claimed, the terms "interactive device," "card," "interactive card," "smart card," "optical card," are used interchangeably.

The term "sponsor" is used herein in its broadest possible sense, and may include without limitation entities that issue the hand-held devices and entities that accept them or provide redemption services for users of the cards. Sponsors may also include health care and medical institutions and other service or eleemosynary organizations.

The term "computer" is used herein in its broadest possible sense, and may include without limitation a laptop computer, personal computer, mobile phone, personal digital assistant, or other computer like devices.

Summary of the Invention

Among the several objects, features and advantages of the invention may be noted the provision of interactive hand-held devices for carrying out various modes of novel and commercially advantageous signaling, information-transferring, and value-indicating methods.

The hand-held devices of the present invention are portable devices such as smart cards, mobile phones, and personal digital assistants ("PDAs"), which contain means to receive auxiliary data. The hand-held devices, to
5 provide some of the promotional opportunities described herein, preferably have means to connect to the Internet, which may be referred to herein as "network access", "wireless access", "Internet access" or "wireless Internet". These hand-held devices react from
10 the reception of auxiliary data from sources including radio transmissions, computer systems, video recordings, video transmissions or other sources for reproduction of video, audio and/or other data. The hand-held devices, which preferably contain optical or electrical detection
15 and decoding means, respond to auxiliary data received from a video display. All video displays, whether a television set or monitor, television-like, or image-presenting display device capable of displaying an image containing a modulated video signal, may in the present
20 specification be collectively referred to simply as "display devices."

Signals are received, detected, and reproduced by the new hand-held devices for various purposes including: enjoyment; promotion; coupon or prize validation;
25 advertising by sponsors; advertising verification and polling; transfer of information; data collection; commercial verification; security and access; education; game playing; transactions, verifications, or redemption by sponsoring entities or related commercial locations at
30 points of sale including the Internet; other commercial and non-commercial purposes.

Transmission of auxiliary data to the hand-held devices is encoded using a system of video modulation, preferably as described in Broughton or Ciardullo, but
35 alternatively by other known methods in the art including through the use of the vertical-blanking interval (VBI).

The video signals may be transmitted to the display

device by means of a broadcast, cable, satellite or home video.

Other objects, features and advantages of the invention include:

5 A method of television interactive advertisement and promotion signal transmission using interactive hand-held devices in such a manner that both the mode of transmission of information and the display of received information and/or value indicative thereof will attract
10 viewers' attention, stimulate viewers to watch a transmission (which may be commercial advertising), and effectively entice viewers to respond and take action in response to its reception, as well as achieving the foregoing usage purposes.

15 Thus, there is described herein a system which includes:

A method of such signal transmission that is cost effective, brand efficient, and fun for users of the new interactive hand-held devices;

20 A method of such signal transmission using interactive hand-held devices which effectively increases customer awareness, retention, and differentiation of advertisers' messages and products;

25 A method of such signal transmission using video interactive hand-held devices which allows viewers of television (or video) presentations, including advertising, to directly interact with the devices (such as television receiver or display);

30 A method of such signal transmission using interactive hand-held devices that builds store (point-of-sale) traffic, fosters consumer loyalty, and gives viewers a reason to pay more attention to a company's products, services and advertising;

35 A method of such signal transmission using video interactive hand-held devices which allows viewers of television (or video) presentations, including advertising, to upload received information to a computer

which displays and uses relevant Internet addresses, textual information or code, and other promotional information usable by a computer or computer-like device; and

5 Hand-held devices of the invention are intrinsically simple, effective and economical to make and distribute widely, and are reliable and easy to use.

 The following are merely illustrative of some of the advantages and objects which the new system provides:

10 television advertising response determination; interactive advertising and promotions; attraction of viewers' attention; effectively increase consumer awareness and retention of commercial advertising, messages, announcements, promotions, and specific

15 products and services; increased customer differentiation of products and services; stimulation of viewers to watch commercials; increase of store traffic in response to commercial messages; fostering of consumer loyalty; enhancement of viewer involvement in program content,

20 including commercials; enhancement of viewer retention of the content of commercial and other messages; enhancement of the value of commercial messages; increased product/service sales; saving of advertising costs; acceleration of response time of customers following

25 delivery of commercial messages; verification of contests and awards; enhancement of viewer retention of the related website domain names; reduction of barriers related to e-commerce opportunities; additional and sometimes instant rewards and information obtainable via

30 the Internet. The uses and advantages are more fully developed in the following description.

 Briefly, herein described is a system using hand-held devices that derives benefits from the reception of auxiliary data. Auxiliary data is encoded by modulation

35 of a video signal, thereby creating a composite video signal consisting of auxiliary data and continuous video

program data. The composite video signal is transmitted to and displayed by a display device.

The preferred method of receiving auxiliary data when the hand-held device is a smart card is by optically
5 detecting and extracting auxiliary data on the smart card. The user first positions the optical receiver of the smart card so that it is capable of receiving video signals from the display device. The smart card, when actuated and appropriately positioned, begins receiving
10 video signals. Circuitry on the smart card discriminates whether auxiliary data is present in the video signals (i.e., where the video signals received are composite video signals). If auxiliary data is present, the hand-held device reproduces the auxiliary data for its use.

15 The preferred method of receiving auxiliary data when the hand-held device is a mobile phone or PDA is by detecting and electronically extracting the auxiliary data from the video signal by use of a decoder box. The decoder box has circuitry that determines whether
20 auxiliary data is present in the video signal. The box then transmits the reproduced auxiliary data to the mobile phone/PDA by RF, IR, PCMCIA, or wire transfer. These methods of data transfer are faster and more reliable than optical transmission, and reception data
25 may then be transmitted faster. The box preferably receives the video signal from its source by use of RCA jacks, but may otherwise receive the data through other methods such as through use of super VHS, fire wire, or coaxial means, or may be connected to an RF antennae,
30 integrated into part of the circuitry of the television, or be connected so that the decoder device can receive the video stream.

The auxiliary data, when present, is transmitted from the decoder box to the hand-held device.
35 Transmission to the hand-held device occurs preferably through RF, so that the hand-held device need not be aimed at or physically connected to the decoder.

However, other various methods including IR transmission and direct connection through a computer interface such as a PCMCIA port are likewise capable of receiving transmissions from a decoder box. The decoder box may
5 also function as a two-way device, and may receive information from the mobile phone/PDA. The decoder box may, with an appropriate graphics rendering unit, display information received from the mobile phone/PDA on the screen. As an alternative to or in addition to the
10 mobile phone/PDA having network access, the decoder box may alternatively contain network access. The decoder box may additionally contain means to control various devices such as the VCR. Users, upon receipt of information such as a television schedule on their hand-
15 held device, may transmit a request to the decoder box or VCR to schedule recording of a television program. It will be appreciate in the art that although the optical method is preferable for smart cards and the electrical method is preferred for mobile phones and PDAs, both
20 methods are interchangeable and may be used for any hand-held device under the present invention.

Among the several methods herein described may be noted a method of video interactive advertising and promotion, comprising normal television programming
25 content modulated to contain auxiliary data, where the auxiliary data is associated with a sponsor and carries information of special significance relative to the sponsor and of special value to television viewers, distributing interactive devices of hand-held character
30 to television viewers for their use and convenience, the devices being capable of selectively receiving auxiliary data or receiving and decoding composite video signals, providing incentives for viewers to use the interactive devices for obtaining the auxiliary data by rewarding the
35 viewers with information of special value, the interactive devices being capable of retaining indication of having received the information, and providing

redemption of the special value for users at a redemption site where users may present the interactive devices.

When auxiliary data is reproduced by use of the card, various possible signals, indications, display readouts, or other interactive events provide the user with a benefit according to content of the auxiliary data. For example, a series of electroluminescent (EL) indicators may operate in sequence to signify coupon value. A LCD readout or other visual displaying device may present information to the user or give notice of value received. Bonus points may be collected and retained on the device. Text, code, or other data may be transferred to a connected computer for which information may be displayed or executed on that computer. In a use of the device in conjunction with a sports presentation, users may receive on the hand-held device's alphanumeric display current sports statistics, including exemplarity, a batter's batting statistics. In a use of the device in conjunction with a car racing presentation, users may receive on the hand-held device's alphanumeric display the lap data, position, speed of a race participant, or other statistics from a racing event. Such statistics may be delivered in real time or delayed. In user of the device in conjunction with hotel access, additional access to rooms and facilities may be available for the user, of which an indication may appear on the LCD.

The hand-held device may have additional capabilities for promotion and interactivity which are preprogrammed or programmed via user input. Such capabilities may include demographic or user information, which may be used in various applications of the hand-held device by a user or sponsor of the device. The hand-held device may also be used to make or facilitate purchases of items.

The design of the hand-held devices are typically in the shape and form of smart cards, palm devices, or mobile phones. The exterior design of the hand-held device may contain indicia of recognized athletes, teams, products or other figures, and the collection of data

located on the card entice users to save, collect, and trade the cards, such as in a rotisserie league. Additionally, other hand-manipulable devices of a similar size and nature that are capable of receiving and processing auxiliary data as described herein are also within the scope of this invention and may receive data by either the electrical or optical methods as appropriate or as is desired. Thus a stuffed animal or toy, snapshot-type camera, replica sports helmet, scaled racing car, or a replica baseball bat with proper circuitry may process the data as a hand-held device of the nature described herein.

Another feature of the present invention is an optional computer interface port. The hand-held device facilitates transmission between the device and other hand-held devices, computers, and other computer-like devices. In promotional applications of the hand-held device requiring Internet access, if the device cannot transmit data and information through the Internet directly through wireless means or other direct connection to the Internet, it may connect to the Internet through use of a computer interface port. Television viewers, upon watching commercials, programs, or movies, use the hand-held device to obtain opportunities for e-commerce or informational purposes. The information may then transferred to computers or computer-like devices where it may be used for informational or promotional opportunities. For example, a talk show may have a discussion about endangered animals. Informational or promotional opportunities such as available books or videos relating to those animals, along with information relating to how viewers may learn more information from a given Internet website, are transmitted in composite video signals received by the hand-held device.

The opportunities are transmitted as the content of the auxiliary data with the composite video signal, and

when the hand-held device is a PDA or mobile phone, is preferably electrically detected and discriminated by a decoder box, and then transferred by RF to the hand-held device for its use. The auxiliary data may also be
5 transferred by other known means including by IR and through direct wiring. Alternatively, the auxiliary data may be optically detected and reproduced by the hand-held device, which is the preferred method of receiving the auxiliary data when the device is a smart card. As a
10 further alternative, the auxiliary may be detected either optically or electrically, and then transferred to and discriminated by hardware or software of a connected computer or computer-like device.

In some of the promotional applications, the
15 opportunities are transmitted with the composite video signal and are preferably optically detected and reproduced by the hand-held device and then transmitted to a computer by an interface. However, the auxiliary data may alternatively be electrically detected by a
20 decoder device, transferred to the card and discriminated, and then transferred again to a computer via an interface. As a further alternative, received composite video signals may be transmitted from the hand-held device to a computer by an interface, where the
25 auxiliary data is discriminated and the opportunities are then detected and reproduced by the computer. By any of the methods described herein, the opportunities once available to the computer can be stored and used, such as for e-commerce or information collection.

30 When appropriately connected, the stored information from the computer-interface card is uploaded (when appropriate) to a computer for processing and fulfillment. The information received by the computer includes a web page, Internet address or Uniform Resource
35 Locator ("URL"), Hypertext Markup Language ("HTML") or similar textual information or code that can be displayed to or executed for a user. This information provides a

means for the user to obtain benefits through interactivity, and for the sponsor to provide promotional information to the user.

Devices and methods are provided under this invention which allow an electronic coupon to be redeemed at a point of sale using existing point of sale "(POS") hardware and software. In addition, the coupon can be configured to be used only once and with a reasonably high degree of security. Furthermore, check out time is not seriously degraded and multiple coupons may be redeemed at the same POS with relative ease. One method of using the card at a POS, involves the user giving the hand-held device to the cashier. The cashier then locates the correct coupon or redemption value on the hand-held device using a scrolling function in combination with the LCD. The hand-held device is then held such that the LCD is facing towards the cashier and the photodetector faces the bar code scanner. The "redeem" button is then pressed, and the photodetector on the hand-held device passes over the bar code scanner. The timer in the hand-held device resets the device to non-redeem mode if a scan is not detected within thirty seconds. When the scanning laser light is detected by the hand-held device, the device beeps and a numeric code is displayed which may correspond to a stock keeping unit (SKU) number or other information regarding receipt of product shipment, inventory, and/or stocking. Other codes, including an additional numeric code such as the serial number of the hand-held device or a security code can also be displayed. The cashier then enters the numeric code or codes and the appropriate discount or value is applied to the purchase of the consumer. The timer may also delete the coupon if the hand-held device is scrolled to the next coupon, or if the device is powered down and then powered up again. The coupon may also be erased either automatically or manually by pressing predetermined buttons on the hand-held device.

Various other methods of the invention are set forth in the following description and claims. Similarly, other objects and features will be apparent or are pointed out more particular herein below.

5

Brief Description of Drawings

FIG. 1 is a perspective view schematically illustrating use of any of several embodiments of an interactive card in accordance with and embodying the present invention.

FIG. 2 is a perspective external view of a first embodiment of an interactive card in accordance with and embodying the present invention.

FIG. 3 is an external view of a second embodiment of an interactive card of the invention.

FIG. 4 is a perspective external view of another embodiment of an interactive card of the invention.

FIG. 5 is a perspective view of internal features of the interactive device of FIG. 4 of the embodiment of FIG. 4 showing an interactive card of the invention.

FIG. 6 is a perspective external view of another embodiment of an interactive card of the invention.

FIG. 7 is a perspective view of internal features of the interactive device of FIG. 4 of the embodiment of FIG. 6 showing an interactive card of the invention.

FIG. 8 is a schematic diagram of circuitry that may be used to provide various embodiments having circuit features evident in this diagram.

FIG. 9 is a schematic diagram of other circuitry that may be used to provide various other embodiments.

FIG. 10A is an external view, from a user-opposite position, of one surface of yet another embodiment of an interactive card of the invention, termed a camera card, showing the camera-like surface of the card during use.

FIG. 10B is reverse view of the camera card of FIG. 11A, showing an opposite surface of the card on which user display and controls are provided.

FIG. 11A is an external view of another embodiment of an interactive card or device of the invention, showing a surface of the card that is camera-simulative as according to FIG. 10A, and where again the card or

device simulates the form of a hand-held camera, and is also referred to as a camera card.

FIG. 11C is reverse view of the camera card of FIG. 11A, showing an opposite surface of the card on which user display and controls are provided.

FIG. 12 is an external view of the camera card embodiments of FIGS. 10 and 11, showing how the camera card is used, as by sighting through a viewfinder of the card.

FIG. 13A is a perspective view of yet another embodiment of an interactive card of the invention, and referred to as a sports card.

FIG. 13B is a front view of yet another embodiment of an interactive card of the invention, and referred to as a sports card.

FIG. 14 is a block diagram of other circuitry that may be used to provide various other embodiments.

FIG. 15 is a block diagram of other circuitry that may be used to provide various other embodiments.

FIG. 16 is a block diagram of other circuitry that may be used to provide various other embodiments.

FIG. 17 is an electronic/optical signal detection circuit.

Corresponding reference characters identify corresponding elements throughout the several views of the drawings.

Description of Inventive Embodiments

Referring to FIGS. 1-3, in a system of the invention, and in accordance with the various methods herein described, composite video signals are received and projected by a display device 10, to be received by a first embodiment of an interactive hand-held device of the invention 12. Display device 10 is representative of a television screen, video monitor or other video display, movie screen, computer monitor, video-converted display or video-like display, capable of receiving

analog or digital video or video-representative signals from a suitable source, such as a television transmitter, a videotape, streaming video servers, a Digital Versatile Disc ("DVD"), or the computerized display representation of such a source of image content. For present purposes, however, it will be assumed that display device 10 is a kinescope or other conventional type of television display or monitor (which may, of course, include multiple or single-beam types of projector displays).

Thus, display device 10 may schematically represent a video display for displaying video signals but may alternatively be any sort of electron gun, active, array or passive array display device capable of providing not only imaged information in a visible mode but also auxiliary information (e.g., data) in a substantially transparent mode. Display device 10 may be further characterized as a computer monitor or display, as well as a portion or window of such display device. Display device 10 may also be a high definition or digital television, or other digital video presentation device. Video signals include those delivered by microwave relay, satellite retransmission or cable, streaming and other types of downloadable or viewable computer video presentations, and those generally made available by wired or wireless methods.

The new interactive hand-held device 12 may be in the form of any type of hand manipulable device such as a smart card, cell phone, PDA, or other palm like device and is illustrated in FIG. 1 as a smart card. Hand-held device 12 may be held in the palm or between the fingers of a user in the generally vicinity of display device 10, typically within the same room and, when necessary, suitably oriented so that the device 12 optically receives light from a visual representation of the video signal from the display device. When hand-held device 12 is a PDA or mobile phone, it is preferably configured to receive RF transmissions but may alternatively receive

other signals such as IR, and should be suitably oriented or connected to receive the auxiliary data or other signals from a decoder box. When hand-held device 12 is a smart card, it typically is within the same room and
5 suitably oriented so that the card can receive light from a visual representation of the video signal from the display device.

Hand-held device 12 is depicted in FIG. 2A as a PDA and show in a manner in which it may be held and used.
10 Hand-held device 12 may include a PDA-sized housing 14 that encloses various circuits and circuit components ("Circuitry") of the device. Hand-held device 12, when in the shape of a smart card (as will be further shown in FIG. 2C), may be thicker than a credit card as desired or
15 as needed to contain within housing 14 circuitry for carrying out functions as described below. Housing 14 may be of any hand-held shape desired that is functional and hand manipulable, examples of which include a PDA (as shown), cell phone, PCMCIA card, snapshot-type camera,
20 replica sports helmet, replica baseball bat or football, or scaled racing car.

On front surface 16 of hand-held device 12 is an imprinted brand name of a sponsor 17, and possibly information or indicia that may induce a user to
25 associate device 12 with a particular sponsor 17. When hand-held devices 12 are inexpensive to manufacture, such as when they are in the form of smart cards, imprinted sponsors 17 may be found with higher frequency. However, when hand-held devices 12 are the user's personal device
30 such as a cell phone or PDA that have primary uses other than receiving promotional opportunities, such indicia may not be included. Sponsors 17 may include various entities such as advertisers, Internet websites, television shows, other occurrences, programs or events,
35 for which use of the device will provide interactive opportunities. Sponsor 17 may be a company providing the hand-held device 12 to a user of its service, such as a

hotel, phone company, PDA service, or place of business, that uses device 12 for access, privileges, and/or rewards.

5 A leading edge 18 of the hand-held device 12 in PDA-like shape may include an RF antenna 68 to receive auxiliary data as is described herein below. Visible from front surface 16 of the device is a visual display 20, of which alternatively or additionally may be light-admitting diodes or other electro luminescent light
10 sources 20a, 20b, 20c, and 20d as shown in FIG. 2B. Hand-held devices 12 have various users controls and may include a keypad or touch screen (not shown) to allow user input for specific functions and additional uses.

Hand-held device 12 is depicted as a smart card in
15 FIG. 2C in a manner in which it may be held and used. Hand-held device 12 includes a credit card or wallet-card-sized housing 14 that encloses various circuits and circuit components ("Circuitry") of the device. Housing 14 of hand-held device 12 may be thicker than a credit
20 card as desired or as needed to contain within the circuitry for carrying out functions as described below.

Housing 14 may be of any hand-held shape desired that is functional and hand manipulable, examples of which include a PCMCIA card, snapshot-type camera, replica
25 sports helmet, or scaled racing car.

A leading edge 18 of hand-held device 12 may include a lens or small aperture 36 to admit video signals to a photosensor within housing 14, as is described herein below. Visible from front surface 16 of hand-held device
30 12 are a plurality of light-emitting devices 20 which may be light-admitting diodes (LEDs) or other electro luminescent light sources, including, for example, regions of a LCD of either active or passive type.

A typical manner in which hand-held device 12 is
35 used and the lights are operated is as follows: A user watches a television presentation such as a commercial, television program, movie, or other video-displayed

program. When such a presentation is displayed, the user may then hold hand-held device 12 as shown in FIG. 2B or 2C. The user positions hand-held device 12 so that leading edge 18 of device 12 will be in a position for receiving video signals from display device 10. Hand-held device 12 or display device 10 may have indicia informing the viewer to press the pressure membrane or button 22 at a preferred time, such as when a commercial of a sponsoring entity appears. Although the term "button" is used herein, it is considered to include membrane switches, pressure or touch regions capable of activation and carrying out the function of a button. When the user presses button 22, the video signal will be detected and received by a photodetector (the process to be described below) within housing 14. The composite video signal comprises a video signal modulated with auxiliary data, in accordance with the teaching of the above-referenced Broughton and/or Ciardullo each of which are herein incorporated by reference. A discriminator, implemented by circuitry of hand-held device 12 determines whether auxiliary data has been transmitted along with the video signal of the presentation.

However, the video signal may be received by a decoder box which then discriminates the auxiliary data and transfers it to the hand-held device 12 by RF or by other means including IR or a computer port and direct wired connection. The received video signals may be sent through an interface (to be described below) of the hand-held device 12 to a computer or computer-like device where the discrimination of auxiliary data may be implemented in the computer's hardware or software.

If the discriminator determines that the transmitted video signals contain auxiliary data or auxiliary data is received, the circuitry of the hand-held device 12 may then cause an audio transducer 34 present on the printed circuit board to sound a tone or "beep", providing assurance that the auxiliary data has been received

satisfactorily. A suitable aperture may be provided on the front or rear surface of hand-held device 12 to allow sound to pass from audio transducer 34.

Hand-held device 12 may contain more advanced means
5 of providing sound to a user. Hand-held device 12 may contain advanced sound circuitry so that the device can play digital audio signals comprising songs or instruments. The songs may be prerecorded to hand-held device 12 and may be triggered upon proper notice, or
10 they may be downloaded in delayed or real-time and thereafter be played. Thus, versions of hand-held device 12 that are capable of music may synchronize songs through multiple devices by transferring and receiving information from the other devices 12, along with
15 optional source of the auxiliary data.

The circuitry of hand-held device 12 may also cause operation of one or more of lights 20a, 20b, 20c, and/or 20d of FIG. 2B or FIG. 2C, to indicate a value (whether it be a discount, prize, coupon, or item) that has been
20 received. For example, one light 20a may entitle the user to a free beverage at a sponsor's store location. Two lights 20a and 20b may indicate a substantially larger coupon value, such as a twelve-pack of a beverage. A coupon value causing three lights 20a, 20b, and 20c to
25 be illuminated may indicate entitlement to a grand prize, such as a free supply of a beverage for the lifetime of the user. The term "light" is intended to mean any kind of display useful for conveying a signaling or indicating purpose visible to the user.

30 It is also possible to use the lights 20a, 20b, 20c, and/or 20d of FIG. 2B or FIG. 2C in alternative methods to confer benefits from reception of auxiliary data. For example, different colored lights 20 may be used with each color representing a different prize or different
35 value. Alternatively, hand-held device 12 may be programmed to operate so that a light 20 shows each time a different commercial of a sponsoring entity is shown,

so the user will have inducement to watch multiple commercials to be entitled to a prize or benefit.

The hand-held device and lights 20a, 20b, 20c, and 20d operates in the following manner: During a commercial or at the appropriate time, a user pushes
5 button 22 to receive video signals by a preconfigured hand-held device 12. If the appropriate auxiliary data was present in the received video signal, hand-held device 12 then validates the receipt of the auxiliary
10 data by illuminating a first light 20a. During a further commercial a second light 20b illuminates. During a third commercial a third light 20c illuminates, and during a fourth commercial presentation, light 20d illuminates. The user may then appropriately present
15 hand-held device 12 at a vendor location, redemption center, or Internet website to determine if the device is one for which a special prize is to be awarded. If hand-held device 12 does not entitle the user to the special prize, a consolation or alternative prize may be made
20 available. A different variation of illumination of signal lights 20a, 20b, 20c, and/or 20d may entitle the user to alternate consolation or other prize.

Alternatively, the lights may work in the following manner: During each quarter of play, when a commercial
25 appears the user may press button 22. When auxiliary data has been successfully received (by the process of which is described above) from the commercial sponsor 17 of an event or of hand-held device 12, the first light 20a will be illuminated to indicate receipt of the
30 commercial during the first quarter. Such operation will continue through successive quarters until all lights are illuminated. The user may then present hand-held device 12 to a store or point of sale operated by the commercial sponsor 17 to receive a prize or grand prize, depending
35 upon the configuration of device 12. Or, the user may be rewarded in accordance with how many lights 20 are illuminated. Then, the user may thereafter tender hand-

held device 12 for value redemption, or may present it, for example, at a lottery at which the devices 12 may identify the user's name by users, and where the device 12 is drawn.

5 The store location, point of sale, or sponsor's website may include means for resetting hand-held device 12 so that it may be used again in a similar manner during a future presentation. Such means may include leaving indicia of a previous award reception on hand-
10 held device 12, such that a user may only redeem their benefit a limited number of times or for a limited duration. Hand-held device 12 may have a code on the back such that a redemption center may verify that the receiver of the benefits of device 12 was in fact
15 entitled to receive them and that device 12 has not been modified to receive an unauthorized benefit.

It will be appreciated from the foregoing that viewers using hand-held device 12 may be induced to watch a presentation that they might otherwise not be so
20 inclined. The inducement may span a series of commercials, causing users to watch presentation after presentation, as during successive days or weeks. Also, advertisers may make a better determination as to who has been watching and paying attention to their commercials.
25 When users return or bring in hand-held device 12 to the benefit redemption center, advertisers will have knowledge of how many people actually took advantage of the promotion. The hand-held device 12 not only induce the viewer to watch a commercial, but also induces
30 viewers to visit a sponsor's place of business, point of sale, or Internet website at which they may receive the value indicated by hand-held device 12 indicated by a visual display 20 such as the lights 20a, 20b, 20c, and/or 20d or a code displayed by LCD 44 of hand-held
35 device 12.

Another example of use of hand-held device 12 is as follows: On a television broadcast, the announcer

discloses last minute air fare specials indicating available flight times and cost. The video signals are modulated to contained auxiliary data with flight information. Interested users capture the auxiliary data
5 containing their selected flight opportunity. After receiving the data, users may view the opportunity directly on LCD 44 of the hand-held device 12, or alternatively be provided with a special Internet link to the opportunity. Users with Internet access may purchase
10 the opportunity directly, for which they may receive a confirmation for the ticket purchased. Users without network access may connect hand-held device 12 to a computer with Internet access to access the airlines Internet website, verifying the availability, the cost,
15 the flight information, and the restrictions to complete their purchase. Alternatively, users may be required to arrive at the airport on a first come first served basis to complete their purchase and take their flight much as a last minute stand-by passenger makes a ticket purchase.

20 There are various incentives for a user to watch a sponsor's televised presentations including commercials, which include amusement or information of value to the user. For example, during each quarter of a game, a user would view commercials to obtain an indication of
25 participation by means of lights 20a, 20b, 20c, and/or 20d during the successive quarters. The user knows they may take hand-held device 12 to a POS operated by the sponsor and receive a prize for having watched. Common advertising strategy for sponsors of major sport events,
30 such as "bowl" games, is to provide a presentation during each quarter of the game.

During nationally-televised "super" events such as the well-known Super Bowl, World Series and "bowl" games, increased viewer ratings induce advertisers to provide
35 impressive commercials to which users will not only pay attention but will also interact, watch, participate, and be favorably impressed by such commercials. Hand-held

devices 12 when used during such televised presentations offer advertising sponsors an unparalleled opportunity for promotional activity and for assuring audience participation, as well as providing an exceedingly
5 effective methodology and means by which the percentage of successful viewer watching and product/service interest may be measured.

Multiple advertisers may use hand-held devices 12 for either the same event or for multiple events. For
10 example, if a commercial is presented during a television show relative to a first sponsor's product 17 or service (such as relating to automobiles) with which there is a relation to a second sponsor 17 (such as bank providing financing for the sale of those automobiles), hand-held
15 device 12 may be especially adapted by its resident instruction set to be "co-branded," so as to respond to both sponsor's presentations. The co-branded hand-held device 12 may be used to provide special inducement such as through a prize or other value upon presentation at a
20 bank, a dealer, or Internet website affiliated with or sponsoring the commercial presentations. Many other co-branding possibilities for hand-held devices 12 and their usage will be evident.

FIG. 4 illustrates features of hand-held device 12, including the provision of aiming light 24 on the face of
25 the hand-held device. Aiming light 24 is typically included on embodiments of hand-held device 12 where video signals are optically received by device 12, such as to indicate that device 12 is positioned such that it
30 is capable of capturing video signals emanating from a display device 10. When button 22 is pressed while the leading edge 18 of hand-held device 12 is generally oriented toward display device 10, received composite video signals cause illumination of aiming light 24 to
35 indicate that video signals are being received. Aiming light 24 illuminates for so long as data is being received, for a predetermined period of time sufficient

to indicate that hand-held device 12 is oriented or aimed correctly, or for a long enough time period as to enable the encoded signals to be received by device 12. Aiming light 24 may be included on embodiments of hand-held device 12 where the video signals are electrically received to alert the user that auxiliary data is being received through IR, RF, or the computer interface.

Referring to FIG. 5, the internal features of hand-held device 12 are illustrated. They may be seen to include a printed circuit board 26 having integrated circuits 28 including push-button 22 and aiming light 24, which may for example be a LED. The circuit board includes at an appropriate location, an optional photocell 30. Photocell 30 is appropriately oriented so that it may receive light through a suitable aperture 36 (not shown) along leading edge 18 of hand-held device 12, which aperture 36 may be at a location as shown in FIG. 3. The circuit is powered by one or more batteries 32 or other suitable cells (not shown), intended to provide sufficient power for operation of hand-held device 12 for days, weeks, months, or years. Batteries 32 may be used with other similar sources of portable power (not shown), such as solar cells. It will be appreciated the electronics of a PDA, cell phone, or other computer-like device capable of processing auxiliary data as described herein may contain significantly more electronics to provide functions to herein described that to relate to the other functions of hand-held device 12.

Three lights 20 are shown present on the circuit board, and they make take the form of LEDs. However, as will be understood from study of FIG. 14 the circuit may include provision for more than three such lights. For example, it may include circuits for energizing up to nine LEDs.

Referring now to FIG. 6, an embodiment of the hand-held device 12 devices is shown including the provision for an LCD 44. LCD 44 may be a textual display

consisting of 16 digits, but less or more display capability may be provided, based on need and usage. Alternate LCDs 44 capable of presenting the graphic content in monochrome or color, however, are preferably
5 used.

Hand-held device 12 has an power button 38 which when depressed will initiate operation of an LCD 44 to display a coupon, a prize notification, or other information indicating receipt by the device of auxiliary
10 data. For example, LCD 44 may used to display a first coupon in a circularly linked list of offers. Power button 38 may also held to initiate receiving video signals, or may be used for other display or control purposes separately from button 22. Scroll button 40
15 allows a user to traverse, i.e. scroll, information retained or received by hand-held device 12, for example, the circularly linked list of offers received and stored on the device 12. It will be appreciated that any of the various buttons 22, 38, 40, or 42 may be implemented by
20 using other buttons with other functions on hand-held device 12, such as the numbered buttons on the cell phone or shortcut buttons on the PDA. It will furthermore be appreciated that these buttons 22, 38, 40, or 42 may be implemented via touch screen, such that there is no
25 physical button 22, 38, 40, or 42 on the device.

The expiration button 42, at any time while viewing an offer, when pressed displays the expiration date of the coupon value and when released shows the original offer again, or alternatively switches between the
30 different displays. The expiration button 42 may display the date of hand-held device's 12 expiration, after which the device will no longer function or will have reduced functionality. The expiration button 42 may display the expiration of a program or function of the hand-held
35 device 12. The functions and programs of hand-held device 12 may be reused until expiration, and such reuse may include watching various games during a season,

watching all quarters or periods of play, and watching appropriate commercials.

As a further alternative, expiration button 42 when depressed or depressed in conjunction with other buttons 22, 38, or 40 may additionally display data information about where hand-held device 12 was issued to the user, where the user lives, a serial number, and other data that a sponsor may desire. The displayed data may also identify the holder of hand-held device 12 and may have a number, personal identification number, or other data personal to the holder, such as residential address. It may be desirable or necessary to disclose to the user the extent to which such personal information will be collected by use of hand-held device 12.

Accordingly, when hand-held device 12 is used at a redemption center, such as a point of sale, Internet website, or restaurant operated by or on behalf of sponsor 17, a benefit may be received by the user. Information about the user, based on data stored on the device, may then made available to the sponsor, merchant or other seller of product or service. In that way, the sponsor 17, merchant or other seller of product or service may learn about their customers, possibly adding the user's name or address or additional information about the customer to a customer base.

Offers received by hand-held device 12 may be indicated not just by illuminating the light signals 20, but by textual information and graphics displayed on LCD 44. Auxiliary data may contain offers which includes instructions or identification of the redemption location. The text may otherwise identify the product or discount or other coupon to be redeemed by the user. For example, hand-held device 12 may be used in a mode in which the device receives composite video signals which trigger preprogrammed offers that already exist in a linked list stored on the device 12.

After watching a commercial, auxiliary data causes

hand-held device's 12 preprogrammed textual information to indicate a product, discount, or other coupon available until an expiration date. Hand-held device 12, upon receipt of auxiliary data, retrieves the information and makes the offer available to the user.

Alternatively, the information may be received by hand-held device 12 during use and then decoded and displayed on LCD 44 as well as being added to the linked list.

Hand-held device 12 is useful to store multiple offers. Multiple offers may be from the same sponsor or different sponsors 17. The received offers may be valid for certain different amounts and for varying periods or dates. The hand-held device 12 may also be able to store previously received offers so as to indicate that a user will not be able to reuse them, as for example in the case of a prize or other one-time benefit.

Items displayed on LCD 44 are coupons which provide offers, coupon values, validation for discounts or other user benefits, such as prize merchandise identification or location for redemption. When hand-held device 44 is taken by the user to a redemption site, such as to the sponsor 17, merchant or other seller of product or service center, items stored on hand-held device 12 may be cleared by an authorized procedure at the redemption location, but alternatively the stored items or coupons may be reused until an expiration date. The coupons may contain the date the commercial originally ran, or the date the coupon was received by hand-held device 12. In other words, the auxiliary data may have an encoded date stamp, or the hand-held device 12 may date stamp the information received. The date information may inform merchants or sponsors of the least or most effective showings of their commercial.

It may also be desirable to purchase items from the use of hand-held device 12. Hand-held device 12 may store purchasing information, such as the numbers of one or more credit cards. This feature may be used, for

example, when hand-held device 12 is capable of receiving multiple offers. After such an offer is downloaded to hand-held device 12, the user connects the device to the Internet by any of the methods described herein. The user selects the offer, and selects to purchase the discounted item. The stored credit card and shipping information are transferred through the Internet to carry out the transaction. Hand-held device 12 may also store other data sufficient to make purchases, such as debit card or online wallet service information.

FIG. 7 shows circuit features of the card embodiment of hand-held device 12 without housing 14. LCD 44 is evident, as also controls 38, 40 and 42, and a pair of batteries 32 are located at the right side of the circuit board.

FIG. 8 shows a chart of an alternate embodiment of hand-held device 12 having an input-output means preferably in the form of a Personal Computer Memory Card International Association ("PCMCIA") interface, such as may commonly be found on a laptop computer. PCMCIA interface 70 connects with PCMCIA connector 72 to transmit information to and from a computer or computer-like device. Connections of PCMCIA interface 70 to a computer are preferably made by a PCMCIA port, but the connection means may alternatively be through other known computer and computer-like slots, connections, and ports such as Ethernet, Token Ring, infrared ("IR"), RF, Small Computer System Interface ("SCSI"), Universal Serial Bus ("USB"), parallel port ("Parallel"), serial port ("Serial"), IEEE 1394 FireWire ("FireWire"), S/PDIF, AES/EBU, fiber optical cable, and Apple Desktop Bus ("ADB"). Hand-held device 12 may also utilize portable data storage, such as flash memory, mini-disc, or stick memory, to manually transfer information from hand-held device 12 to a computer. The types of connections used in various applications of hand-held device 12 vary based on factors including cost, transfer speed, and acceptance

by users and industry.

Hand-held device 12 while preferably connected when applicable to a computer, may also be connected to computer-like devices or other devices capable of processing information transferred or executing functions from an computer-interface device. These devices include PDAs or other palm top PCs, cellular phones, and other hand-held net-connected or computer-like devices. The hand-held devices preferably have wireless Internet access, which allows for instant Internet transactions without utilizing a computer or computer-like device.

As with various other embodiments of hand-held device 12, composite video signals are preferably received by electrical means, shown herein shown as by an RF antenna 68. The power and functionality of the hand-held device are increased by additional RAM 51 connected to the microprocessor 50. The power system of the hand-held device, comprising battery 32, optional solar panel 33, and the power control 31 adequately provide the power needed for processing and interfacing with the various devices. Composite video signals may also be received by photocell 30, herein shown as a photodetector 30a and an optical receiver circuit 30b.

Preferably, the video signal is received electrically from display device 10, the auxiliary data is decoded, and transferred to hand-held device 12 by RF means. Alternatively, the video signal received by the device may be discriminated by the microprocessor 50 of hand-held device 12. As a further alternative, hand-held device 12 may receive the video signal by optical or electrical means, and transfer the received data through the PCMCIA interface 70. If the received data is processed on a computer, the computer may act as a discriminator, determining when auxiliary data is present and handling it appropriately. The data also may be sent back to hand-held device 12 for further processing, promotion, or information opportunities. When the

received data is not sent immediately through PCMCIA interface 70, the data is processed as in other embodiments described herein.

5 A preferable but optional visual response by LEDs 20 or LCD 44, promotional data may be available to the user's computer upon connection of PCMCIA interface 70 with the computer by the PCMCIA connector 72. Such promotional data includes Internet website or addresses, textual information and code, audio, and visual files.
10 Upon receiving the data either by RF antenna 68, optical detector 30, or by PCMCIA interface 70, hand-held device 12 may display an appropriate confirmatory message on LCD 44 or may otherwise notify the user of the reception of data.

15 An example of use of hand-held device 12 is as follows: A store or sponsor 17 issues a hand-held device 12 to a child, or otherwise providing the child with means to interact such as by providing a downloadable program from an Internet website to be used
20 on a cell phone, PDA, or smart card. During cartoons or at other times when children are likely to watch television, a television program is displayed which contains modulated video signals. The program advertises a product sold by stores or created by a sponsor. The
25 children are instructed to use their hand-held device 12 to tell their parents what toy they want for their birthday, holiday, or other special occasion. After capturing the auxiliary data containing information or product data, the children give hand-held device 12 to
30 their parents. The parents may then review the product selected by the child, and purchase the product or services directly if the device has Internet access. If hand-held device 12 does not have Internet access, the parents may connect the hand-held device 12 to their
35 computer with Internet access and purchase the toy or toys directly from sponsor 17, online from an Internet store, or from a store suggested by a representative of

sponsor 17. The toy will then be shipped to the location specified by the user, for which the information may be preprogrammed by the user. If hand-held device 12 has wireless Internet access and a stored credit card and shipping information, the parents may simply enter an approval code and purchase the product with little effort. Alternatively, the parents may bring hand-held device 12 into a store, or send it in to the store or sponsor 17, so that the order can be processed and fulfilled. Thus, parents may purchase the toys desired by their children with minimum time and effort. It will be apparent that hand-held device 12 could alternatively be used in a manner similar to a bridal registry, where the selected objects are not purchased, but are instead listed online on a gift registry. Thus, people who desire to purchase toys for the child will know what they child wants.

Another example of a use of hand-held device 12 is as a loyalty device which stores bonus points in the memory of device 12 and/or at a remote location such as a central computer. Hand-held device 12 stores bonus points for television shows or movies watched containing auxiliary data with bonus point values. Shows may require the user to obtain the auxiliary data at the beginning, during, at the end, multiple times during the show to receive the bonus points for watching the show. Users may receive additional bonus points by purchasing VHS or DVD movies, movie theater tickets, or merchandise.

Users may receive additional bonus points by visiting the sponsors' Internet websites, and even more for exploring their website and making online purchases. Users may receive even more points by responding to quizzes, questions, and surveys after television shows or movies. Users may interact by using hand-held device 12 to select their answer, and either upload their answer through the Internet, or verifying their answer upon review at a store. Users may earn additional bonus

points by trying out specific restaurants related to the sponsor or, if at an amusement park, for rides and shows sponsored by the sponsor. Thus, users have various opportunities to amass bonus points from many various
5 sources by a sponsor or groups of sponsors.

FIG. 9 is another embodiment of the hand-held device 12 with an input output interface in the form of a PCMCIA interface 70 and docking station 76 as shown. The docking station 76 may receive discriminated auxiliary
10 data or composite video signals and transfer it to hand-held device 12 by PCMCIA interface 70. Alternatively, docking station 76 may contain optics, which may be used to optically detect the video signal from a display device 10. Then either the entire video signal may be
15 transferred to hand-held device 12 so that device 12 can discriminate the auxiliary data, or the docking station 76 itself can discriminate the auxiliary data and transmit the auxiliary data to the device. The data may then be transmitted to hand-held device 12 by IR, RF, or
20 by PCMCIA interface 70.

Docking station 76 may charge the battery 22 by its battery charging control 80. Docking station 76 may implement various device functions and advanced device functions by controlling hand-held device's 76
25 microprocessor 50 through the interface drive 78.

The hand-held device 12 in FIG. 10A may be termed a camera card 12C, as it is similar to other devices 12 described herein, yet configured to simulate and suggest to the user the appearance of a small snapshot-type
30 camera.

Camera card 12C includes housing 14 in the shape of a small camera, and a lens or lens simulation 36 suggesting use of the camera-like hand-held device just as a user would use a snapshot camera, to take a
35 "picture" of the display device 10. Camera card 12C includes a simulated lens 46 either imprinted, embossed, molded, or otherwise extending slightly above the surface

of a camera-like housing 14 so as to present a more realistic simulation of a camera lens. The data-receiving photocell 30, when present, collects information in the same manner as previous embodiments using optical detection, and may be located behind simulated lens 46 or beneath a suitable aperture 36.

Button 22 when depressed and released simulates the shutter of a camera. Thus, it causes camera card 12C to receive either composite video signals or auxiliary data (depending upon the method as described above) until such collection is complete, thus the user simulates taking a snapshot or picture.

A viewfinder 49 is provided in the form of an aperture extending through housing 14, suggesting that a user aim at display device 10 through viewfinder 49 as they would on a real camera. Viewfinder 49 need not have any special accuracy or lenses, as its primary purpose is to simulate the look and feel of a camera. Camera card 12C will operate properly when its surface containing photosensor 30 is oriented toward display device 10, and its orientation need not be precise in the sense of a camera but only approximately directed toward the source of video signals. Photosensor 30 may be positioned behind lens simulation 46 or elsewhere for suitable sensitivity to video signals emanating from display device 10:

Other nonfunctional decorations (not shown) may be provided with camera card 12C to make further suggest to the user that they are taking a picture. Examples of such include a wrist strap attached to the camera, a camera case, an audio transducer in the circuitry of the camera card to make a clicking sound, or a flash.

FIG. 10b shows the reverse face or side of camera card 12C. It has controls and display features similar to those shown in FIG. 6. A difference is that enabling button 22 may be located along a top surface or edge of the camera. Camera card 12C is intended to allow users

to better conceptualize the process of receiving composite video signals from a display device 10. Use of camera card 12C may also provide other unique and fun opportunities such as pretending to take pictures and receiving such offers as previously stated.

FIG. 11A is the front of another version of the interactive hand-held device that may be termed a racing card 12R. On the front of racing card 12R is simulated lens 46, of a size smaller size than that of the camera card 12C, enabling more promotional information to appear on the front of card 12C. The promotional information may show or describe the racer or event(s) that the card can be used for or otherwise promote holder usage.

FIG. 11B shows the reverse face or side of racing card 12R. It has controls and display features similar to those shown in FIG. 6. A difference is that the enabling button 22 may be located along a top surface or edge of racing card 12R. Racing card 12R is configured to allow users to better conceptualize the process of optically receiving composite video signals from display device 10. The racing card 12R may also provide other unique and fun opportunities to the user such as receiving driving statistics and various offers and information as previously stated.

FIG. 11C shows the front side, i.e., user-opposite surface, of racing card 12R, with the user preparing to receive composite video signals by means of card 12R, and where the user is aiming card 12R toward display device 10, by sighting through viewfinder 49. The racing card 12R has control and display features like those illustrated in FIG. 11B or 11A.

As racing card 12R is used, auxiliary data may be received which may either update or replace that which is stored in memory of the card. Also, as scroll button 40 is depressed, more data than that displayed by LCD 44 may scroll across. For example, racing card 12R may have stored within its memory information about a race, a

racer, or other information relative to the event. It may include, for example, previous performances, standing of the racer, and biographical information. To provide a suggestion of the use of the racing card 44 and to

5 enhance its attractiveness for users, especially young users, a reproduction of a racing car steering wheel and instrument grouping may appear on the surface of the card, adjacent the LCD 44, as shown.

Turning to FIG. 13, a version of hand-held device 12 which may be termed a "sports" device 12S is shown. It includes housing 14 which is provided with front surface 16 which may include a visual field 54 for bearing the image of a sports contestant. In addition, a LCD 44 is provided together with button 22 which allows the user to

15 initiate operation of hand-held device 12, preferably with an RF antenna 68 oriented for receiving RF signals, or alternatively for optically receiving composite video signals, such as by holding hand-held device 12 so that leading edge 18 is generally towards display device 10

20 presenting a program relating to the sports celebrity or other person depicted on display device 10.

Update button 56 is pressed when user desires to obtain some current information, such as the current statistics of the player depicted on sports device 12S.

25 In operation, sports device 12S may be designed to receive only information relating to the player depicted on the device 12S, update that player's statistics, or add to information about the player already stored in memory of the device, any of which may then be scrolled

30 across LCD 44 by pressing scroll button 40.

Use of sports device 12S is as follows: display device 10 near the user presents a professional sporting event, such as a baseball game. When the sporting event's participant becomes the focus of attention, such

35 as a professional baseball player coming to bat, button 22 may be actuated. An aiming light 24, if present, may illuminate, or instead LCD 44 may initiate a readout of

its newly received statistics associated with the depicted player. For example, the readout may identify his name, his batting average, the number of home runs hit, games played, number of times at bat, and his runs
5 batted-in average and number of stolen bases, with the statistics updated each time such a player is at bat. The statistics may be sent to a computer through an interface (as described above).

A memory of sports device 12S may include such
10 statistics in a non-volatile from which the device 12S is enabled to update the statistics each time the player comes to bat. Auxiliary data associated with an at-bat occurrence received by the sports device may contain information associated with the player, such as his
15 current statistics. As play continues, received auxiliary data may include updates for those statistics based upon the experience of the player at bat. The information is stored in a circularly linked list of data and may include various statistics from different games
20 that the player has played in, various statistics over multiple years for this player; or if this device 12S is for use in watching an entire team, for instance when sponsored by the owner of the team, it may contain different information on various members of the team.

25 For example, as a celebrity batter is taking his turn during a baseball game, the television viewer directs his sports device 12S at display device 10 to receive composite video signals, or preferably configures his device so he may electrically receive the auxiliary
30 data. In both cases, the viewer receives real time statistics about his favorite athlete during the telecast via his interactive sports device. Additionally, the user of a sports device 12S at a live sporting event may receive information without the use of a display device
35 10, such as by RF or IR. Thus, sports fans may get live statistics and trivia through their hand-held device 12 while they watch the game live. Therefore, fans with

obstructed views or sports fanatics may obtain additional information and have fun while enjoying a live sporting event. The information received by the sports device 12S may take many forms including, as noted, statistics such as batting average, home runs, or other personalized information about the player that is stored in the device for future reference or updating. An example of such presentation is shown in FIG. 13B. The stored information may then conveniently displayed on the LCD 44 for the device holder by the push of scroll button 40 or update button 56, or otherwise transferred through a PCMCIA interface 70 to a computer.

Because sports device 12S enables users and owners to trade the devices 12S among themselves, devices 12S takes on a special value and enhances its worth as it is used. As the sports device 12S acquires data and is updated by use during televised play, the device 12S becomes increasingly more valuable and attractive to acquire. The sports device 12S may be of a design resembling a baseball card and may be traded for other devices 12S. In addition, the sports device 12S may be equipped to retain a permanent serial number or edition number, or other information giving the hand-held device unique identity or value and thereby becoming a valuable collectible. Optionally, the sports device 12S may be connected via an interface such as IR or RF to transfer stored information to another device capable of receiving those results. The sports device 12S may therefore be used in rotisserie opportunities.

In addition, the sports device 12S may provide capability for certain permanent characteristic information, such as the batter's name, team, previous teams, and other characteristics, personal data, and additional data that may become permanent based on received statistics and information. Such characteristic information may be called to LCD 44 or otherwise transferred to, received by, and displayed on a computer.

Sports device 12S may be used for coupon indicating and redemption purposes. During play, other information such as a trivia game or quiz may be received by the sports device where the answer will be revealed later, such as during the course of the game, at the end of the game, during half-time, or at any other appropriate time during play. A game may be part of a promotion wherein a user selects the answer and purges the remainder of the stored data, then takes the device to a benefit store or other redemption site during the course of the next week, and has the possibility of receiving some kind of discount or prize based upon the answer selected. Such a game could be part of a "guess today's attendance" at a professional baseball game during seventh inning stretch.

Use of sports device 12S in connection with a baseball game is merely illustrative. Other sports in which players have statistics which change during play, over a year, or which may include information unique to the player, such as hometown or previous teams, may similarly be downloaded or conveyed by the device. Sports device 12S may also be used in connection with concerts and other special presentations, when televised or appropriately presented. Users are able to acquire useful information about the concert or special presentation, such as the names of performers, set lists, the venue location and history, and related Internet addresses. Persons with hearing impairments may receive real time text of live speeches on their hand-held device auxiliary data transmitted by RF is received on the device. Thus, an alternate version of the sports device 12S may be used to receive information relating to monuments, buildings, cars, animals, etc. during the course of a live or video presentation, wherein the transmission to the device may be received and contains auxiliary data.

An alternate version of the sports is a hand-held device that may be termed a "gaming" device. The gaming

device, similarly to the sports device, encourages users to interact with video broadcasts of sport events. However, in this embodiment, users viewing a televised live sporting event utilize their gaming device to
5 predict future actions by a selected player or team to amass points in competition with other users.

For example, two baseball teams compete in a game featuring live modulation of auxiliary data. A sponsor or various sponsors distribute gaming devices to various
10 participants prior to the start of the game. Users predict each pitch to be thrown for selected batters, pitchers, or teams, using a number code or viewing and selecting from the touch screen display for each pitch. Alternatively or additionally, pitching results (i.e.,
15 balls or strikes), hitting results (i.e., strikeouts, walks, hits, home runs, etc.), runs per inning, or other calculable statistics may be selected prior to occurrence. Correctly guessing the occurrence earns points, which accumulate in the memory of the device.
20 Following the game, the device users may submit their hand-held devices either at a collection location or through an Internet connection and submit or upload their scores. The user with the highest point total wins a large prize or discount, with various consultation prizes
25 alternatively available. The predictions may take place for one particular batter, in one particular inning, or for one particular team. Gaming devices may also be used in a similar manner to predict and play other events such as basketball, hockey, and football.

30 Another example of use of the device is as follows:

The user watches a trivia game show, such as the television show "Who Wants to a Millionaire?" The user may able to play long, by utilizing their hand-held device. The question is downloaded and received by the
35 hand-held device, either during the broadcast or prior to the broadcast, by the methods described herein. The questions are synched to the display device, thus when

the display device first presents the questions, the encoded data will trigger the hand-held device to display the question and possible answers. The user chooses the correct answer, or places the answer in order in a timely manner, or must otherwise comply with the rules of trivia game request in a similar manner of the contestants. The user may then receive points or credit for the correct or timely answer based on factors, which may include number of other at home users who answer correctly, or speed of answer. The percentage of at home viewers either nationwide, local, or by other area may be displayed in real or delayed time either on the display device, Internet website, or on the hand-held device. Thus, users may achieve regional or national rankings based on their performance. The final results from the various games may be stored at a central database. Users who score high may receive recognition, a prize, or an option to play a future game.

Another example of use of the hand-held device is as follows: The user takes there hand-held device and appropriately configures it to receive modulated video from a display device. Upon watching an event, such as the "Grammys", performers appears on the screen and performs their song. The users is notified that an interactive opportunity is available, either through their display device or their hand-held device. This may occurs as the modulated video triggers a graphic rendering unit in a decoder box, thus creating an icon appearing on display device. (Therefore not appearing on the display device of people who do not have such as unit.) The hand-held device provides the user with an opportunity to purchase the song or the album on which it appears. The money for the purchase can be through online automation or a third-party Internet website, or may be entered or taken from the website. Or, if the user so desires, an order requiring final approval and payment information can be sent to the user's selected e-

mail address. The user can purchase the music in the following manners directly, through a third party's website such as the affiliate program at "CDNow", or may come directly from the manufacturer. Otherwise, a link
5 for the special purchase can be sent to the user's regular e-mail address. Bonus or additional rewards may be sent such as a bonus disc with previously unreleased material, live songs or videos, or might include a product discount. Alternatively, the user may have the
10 song sent in appropriate digital format to their e-mail account or the selected song could become available for a period of time at a website for the user to download. Finally, the song could become part of a list that when full to the length of a CD is automatically created and
15 sent to the user. It will be appreciate that this method of purchasing can be used with any manner of products sold (such as jewelry on the "QVC network"), or in other fields (such as movies).

The hotel card 12H is yet another embodiment of the
20 card with the functions of a sophisticated hotel room key. The hotel card works with a smart card reader lock system, allowing guests of a hotel to enter and exit rooms, such as a guest's hotel room, garage, or pool area. The hotel card can allow similar access by an
25 optional magnetic strip located on the exterior of the enclosure.

Upon hotel check-in, guests are given a hotel card to use throughout their stay. Hotels and hotel chains may alternatively issue permanent hotel cards to frequent
30 guests and initiate hotels stay with room access on the user's card at check-in. A child's version of the hotel card can be provided upon check-in, to allow children restricted access to hotel facilities and special promotional benefits available only to children.

35 Once a guest receives the hotel card, the card can be used to enter the guest's room and other hotel facilities. The guest user can also use the hotel card

as a charge card, charging products and services internally, such as dinners at the hotel's internal restaurant, gifts at a gift shop, or snacks from a vending machine. The incurred charges will be recorded
5 on the hotel card, appearing on the user's bill at check out.

Coupons, benefits, or information can be loaded onto the hotel card at check-in and at other desirable times and places, such as the beginning of the each day at the
10 hotel's front desk. Using a smart card writer, the hotel cards can be loaded with opportunities for use or redemption over a limited amount of time. These opportunities or coupons may be discounts for local attractions, cash equivalents such as gift certificates
15 for use at particular local attractions such as a restaurants, information on special pricing, or additional access privileges. The card may also load the guest's hotel preferences, including room type and preferred activities.

20 The hotel rooms may optionally provide reader/writers in the hotel card user's room. Data is written to the smart card as a result of the electronic decoding performed by the docking station. The docking station can also read the data from the card, and
25 transmit the information to a central computer preferably by a network line or otherwise by a telephone line. Alternatively, the reader/writer can be in the form of a remote control, acting as a cradle when the card is properly inserted. IR sends data back and forth to and
30 from a networked docking station and remote control.

The reader/writer reads stored data off of the hotel cards, and displays relevant information on the television in the guest's room. Such information may include the total from the purchases using the card,
35 combined with room costs to generate the hotel bill to date. The guest can also purchase items through use of the hotel card and an appropriately connected docking

station for items such as tickets to a local attraction or additional hotel services. An alternative means of reading and writing to the card is through use of a computer and computer interface on the card, as described
5 above.

Guests can obtain additional coupons by viewing television programs modulated with auxiliary data. Such data may be optically received directly to the card, electronically received by the docking station, or
10 received through a computer interface. The information received by the card typically relates to special discounts as well as information about area attractions. Television stations or the hotel itself can modulated the television signals to limit the viewers capable of
15 receiving the signal. Thus, only visitors having the specialized hotel cards can receive the special discount.

The hotel cards can be used as credit cards, and optionally contain a charge limit along with information
20 as to where the card can be used to buy items and then charge them to the hotel room. Thus, businesses outside of the hotel can enact purchase transactions on the hotel card, which are added to the users bill. The charge limit many optionally varies based on guest stay
25 frequency, charge history, or credit history.

The hotel or other sponsor may allow the user to collect bonus points by use of the hotel card. Permanent hotel cards store a running total of bonus points, with optional frequent back ups of the point total to a
30 central computer through properly connected reader/writers. Alternatively, upon each stay the hotel card can be loaded with bonus points earned from previous visits and stored on a central computer. Bonus points can be awarded per stay and per night, or based on other
35 purchases made with the hotel card. Additional bonus points may be earned by visiting local attractions. Bonus points may be redeemed for a gift, discounts, free

meals, room upgrades, a free night's stay, or converted to airline frequent flyer miles.

Agreements with local attractions provide additional means for user advertising. Indicia of various
5 agreements and sponsorships may be visible on the card's enclosure. Various offers and information on attractions may be encoded on the hotel card. All purchase transactions are logged, and the appropriate charges occur when the guests checks out. The hotel can charge a
10 flat fee or percentage for these promotional activities.

Guests have incentives to use their hotel card and visit attractions encouraged by the card. Guests eat at a suggested local restaurant, receiving a discount on the
15 meal, paying by the use of the hotel card, and receiving bonus points. For example, a local restaurant may have a buy one get one free coupon loaded on to the card ,so the guest is more likely to go to that restaurant than a competitor without a coupon. The guest can then visit a
20 major attraction and get bonus points for various suggested activities that they do or items that they buy, for which the purchases can be made through the hotel card. Attractions that wish to honor hotel card promotions should have a reader/writer and a dial-up or
25 network connection to the central computer if a purchase is possible at the attraction. However, accumulating bonus points can be performed by simple write transactions on the card, so that the points are stored on the card and are not immediately transferred to the
30 hotel's computer.

At checkout time, the guest's account is cleared out and paid. Guests, if desired, can have an "express check out" such that they do not need to sign a bill, but simply swipe their hotel card across a reader with a
35 connection to the billing center. The hotel card is either returned to the hotel for resetting for future clientele, is disposable, or is made inoperable until the

guest's future check-in. Before clearing the card, bonus points and information regarding purchases and uses may be stored in the hotel's computer. On the next stay, the user's bonus points will again be accessible.

- 5 Alternatively, a third party or clearinghouse may set up the coupons and distribute the cards. The hotel would then get a percentage of the overall value of the transactions or a sales commission.

10

- Interactive hand-held devices specially configured for conventioners (or conference attendees) may be termed a "convention" device. Convention devices permit conventioners to capture information about various
15 demonstrators and companies by viewing various booths or video presentations and capturing information or opportunities to the device. Information is captured from the reception of auxiliary data, as is described herein. If the demonstrators so desire, the
20 conventioners may receive coupons on their convention device for discounts or free gifts from visiting the demonstrators' booths. The coupons are redeemed by visiting the demonstrator's store or Internet website.

- Another valuable manner in which the devices may be
25 used is to receive auxiliary data at a convention, show, or other any other type of special event, and then offering users opportunities to receive useful information at the special event. For example, a user may watch a video presentation in a convenient location,
30 such as a hotel room, about an upcoming convention. The presentation may show booths, locations or special offers at the convention. As the user sees one of these booths, locations or special offers, the user selectively uses the hand-held device, by pressing its operating button
35 or equivalently initiating control, to cause the device to receive auxiliary data (as described above) which identify these booths, locations or special offers.

Then, the user may visit the convention premises, operating the scroll button of the hand-held device to display the booths, locations, map of the premises, or special offers conveniently and helpfully as the user
5 goes about the convention.

The convention devices may be presented to the conventioners with their name and address preloaded, so that the devices may be conveniently read at each convention booth. The convention devices may also
10 provide conventioner information to the sponsor when used at their store or Internet website.

Before or during the convention, conventioners may watch television in their hotels rooms or in a common area to learn about the companies that will be presenting
15 or have booths at the convention. The conventioners may selectively receive information or coupons from the demonstrators by optical or electrical methods. Users may receive information such as booth numbers and locations, and as well as opportunities for discounts
20 that may be used during the convention.

Another embodiment of the convention device may be referred to as the "museum" device 12M. Museum device 12M allows visitors to track areas or exhibits at a museum. Embodiments of the device may have LEDs 20, to
25 signify receipt of auxiliary data from any of the sources described above. Such a museum device 12M may be used by a schoolteacher to verify that students have visited specific exhibits at a museum or museums that have video demonstrations or otherwise send data through RF.

The museum device's 12M LCD 44 may further direct the device's user. The user is provided with instructions on the location of the next exhibit, time left in the museum before closing or before user's groups departing, redeemable coupons for the museum's gift shop,
30 or other information relevant to the exhibit or museum.

Museum device 12M is usable at a series of locations, such that users obtain indicia or information

from each location. Museum device 12M may be used in activities such as "scavenger hunt", where users must obtain the proper information or indicia from each location to win or complete a game or activity.

5 In FIG. 14 a schematic circuit diagram of one form of circuitry that may be used to provide the features and functions of the several embodiments described herein, elements are identified by their conventional numerology conventional characters proximate of the elements.

10 Optional photosensor 30 is seen to be constituted by a photodiode or phototransistor Q2 which provides the signal to amplification and filter circuit consisting of an operational amplifier U1A including a circuit consisting of the components of C1, R19, R18 and C12

15 interconnected between the output and the inverting input of operational amplifier U1A, and so providing an amplifier and filter. Thus amplifier and filter signal is provided through R15 to a filter and frequency shaping circuit comprising of an operation amplifier U1B having

20 in its feedback circuit the components C10, C11 and R16. These circuits provide a filtered, frequency-shaped output through a resistor R5 through a circuit consisting of operational amplifier U1C and resistor R11. Operational amplifier U1C has an output coupled to a

25 diode pair D11 which thus provides a pair of outputs, the upper to a circuit comprising an operational amplifier U1D, providing in effect a buffer whose output is a data signal delivered through a resistor R20, and the lower of the diodes D11 providing a signal through a resistor R1

30 to a further resistor R7, across which is a capacitor C3. The node between resistors R1 and R7 provides 16kHz signal that is of the horizontal line scan rate or frequency television display optical signals received by photosensor 30 (Q2). The horizontal scan frequency of

35 conventional NTSC color signals is, more precisely, 15.625kHz. (approximately 16kHz, as here described). Similarly, the discriminator circuitry provides at the

output of operational amplifier U1D an 8kHz signal representative of the auxiliary data received, as produced by alternate-line luminance modulation of the display. The discriminator circuit thus described provides both the 16kHz and 8kHz (more precisely, 7.8175kHz), which constitutes the actual data, and determines whether the 8kHz data carrying the information (data) content of the received auxiliary data is present by determining whether average signal magnitude of the 16kHz or 8kHz signals is greater, so that if auxiliary data is present, i.e., there is 8kHz modulation energy in the received light signals, they are provided to a microprocessor of the U2 of the circuit for decoding the information content within the 8kHz signal. Thus, the received composite video signal is amplified and filtered to de-emphasize the 16kHz signal and retrieve the 8kHz signal carrying the data. I.e., wave shaping and frequency shaping filter circuits provided by operational amplifiers U1A & U1B de-emphasize the horizontal retrace frequency and amplify the half-frame rate carrying the data content of interest. The circuits filter the frame rate signal and use it as a reference to compare its relative signal magnitude against the 8 kHz data-carrying signal. If the retrieved 8 kHz signal is of greater magnitude than the conditioned 16 kHz signal, auxiliary data is present and may be utilized by the processor. Microprocessor U2 is preferably of commercially available type Z86E02, and operates according to machine instructions stored in its resident ROM memory. Flowcharts of the functions performed by the machine instructions are set forth in the appendix. Although not separately shown microprocessor U8 includes random-access memory (RAM or DRAM) in which decoded data is stored. Thus, microprocessor U2 is to decode and store, or store indication of, the data present in the 8kHz signal, as by illuminating one of more of the LEDs and causing them to remain on as evidence or indication of the data,

substantially in accordance with the teachings of Broughton, and to drive displays of the device and/or its LEDs or other signal devices, as well as to provide any audio function, as well as also to energize an aiming
5 LED7 when auxiliary data is present. So also, if desired, a signal may be driven by U1 in response to the presence of the auxiliary data, thus providing an aiming light function indicating, in simple effect, that the hand-held device is receiving composite video signals.

10

For providing illumination of lights 20 or 20a-20d described above in connection with the various embodiments, shown here are nine LEDs D9-D18. It will be understood that not all of these LEDs need be used for a
15 specific embodiment of hand-held device 12. That is, the circuit may be configured so as to drive one, two or three or more of the LEDs as according to the desired function and use of the device.

Shown adjacent microprocessor U2 are two diodes D15
20 and D20 which are used to bypass any noise generated from the microprocessor. The speaker SPK1 is element 34 shown in FIG. 5. A clock crystal XTAL1 provides 8MHz clock signal to microprocessor U2. Capacitors C8 and C9 are part of the clock circuit.

25 Immediately adjacent the clock circuit is a switch S1 to provide the function of button 22 in the several embodiments for initiating operation of the device. Switch S1 is tied to a power supply circuit comprising power cells a resistor 14, V2 and V3 (each of 1.5v
30 potential), and a resistor 14, and including a switched analog power circuit comprising a transistor Q1 and resistors 12 and 13 which enable power to be provided to the array of LEDs D8-D18.

Referring to FIG. 14 there is FIG. 15 another
35 version of circuitry invention is shown which may be used to provide still other embodiments of the hand-held devices of the invention. It includes a microprocessor

U2 which may of commercially available type Z86X08. It is similarly provided with 8kHz and 16kHz signals (more precisely 15.635kHz and 7.8175kHz) which respectively constitute the horizontal retrace signal and the data signal at half of that frequency, since the auxiliary data encoded on alternate horizontal lines and so is effectively present at only half the horizontal scan rate, as explained above. These signals are identified as VEILA and VEIL REF that are provided as inputs to microprocessor U2. Therefore, it will be understood that operational amplifier circuits consisting of operational amplifiers U1A, U1B, U1C and U1D provide the same functions of amplification, filtration, frequency shaping and discrimination, as well as buffer circuits described in FIG. 14. The microprocessor, clocked by crystal X1 at 8MHz, decodes the data provided by the composite video signal, stores it in internal RAM or DRAM and drives an LCD 44 illustrated as circuit component LCD1 which may be, as shown, a 16-character by 2-line display. It may instead be a 12-character by 3-line display, for example, or other format appropriate for the display message to be presented at the surface of the device.

Power for the circuit is provided by two cells BT1 and BT2 of 3 volt potential to a circuit including Q2 to provide not only main power by auxiliary power, the later being delivered to the microprocessor for maintaining its continued operation, such as for date and time keeping even when the display is not being operated and collectively referred to as battery 22. A switch S1 is provided for performing the function of power button 38 (as shown in FIG. 6) in the several embodiments and, when pressed, enables power to be provided to the LCD1 and other switching functions may be provided by switches S2, which controls scrolling of the LCD 44, and switch S2 may be actuated by scroll button 40 shown in FIG. 10B. Similarly a switch S3 provides a date function that may be actuated by expiration button 42 shown in FIG. 10B.

These signals control inputs to operational amplifiers U3A and U3D, respectively, and these are provided as inputs to the operational amplifier and also to LCD1. The clear switch will, when operated as described above
5 clause clearing of the date, and the scroll switch enables the user to cause the message across the LCD 44 as that in FIG. 6. Operational amplifiers U3C and U3B provide voltages useful according to the connection illustrated.

10 The circuit embodiments shown are used in conjunction with a method for producing a composite video signal containing video program material and control data, and displaying the signal on a television and decoding such control data for ancillary use, wherein the
15 method includes modulating at least one video field within the viewing area of a television in such manner that the modulation is substantially invisible to the television viewer, thereby producing a video subcarrier component of the signal (which is as indicated detectable
20 at an 8kHz rate) containing the data; and detecting the component to reproduce the data for the ancillary use. Although luminance modulation is particularly useful for that purpose when using hand-held devices in accordance with the invention, chrominance modulation may instead be
25 employed as according to Broughton. Furthermore, the improvements in modulation described in Ciardullo may likewise be used. Various alternative modulation (and corresponding modulation) schemes may be employed as alternatives, including (but not limited to) amplitude
30 shift keying (ASK), frequency shift keying (FSK) modified frequency shift keying (MFSK), and phase shift keying (PSK). And although the substantially 8kHz data-carrying submodulation is at half the NTSC horizontal scan rate, other submodulation techniques may be used at other
35 multiples or submultiples or other periodic rates which are other functions of the horizontal scan (retrace) rate.

FIG. 16 is a block diagram of circuitry of yet another possible embodiment of the interactive hand-held devices, designated 12F, which shows discriminator and microprocessor circuits 50 which are in accordance with
5 FIGS. 14 or 15, and receiving composite video signals by photosensor 30 so as to decode the auxiliary data and provide either light signals as described above, or, preferably, to drive LCD 44 according to the foregoing description. Thus, it includes an update or initiating
10 button 22, as according to the sports device 12S. In addition, an FM receiver 62 and associated antenna 64 may be provided as a surface-mount module added to the printed circuit board of the device. FM receiver 62 and associated antenna 64 may be of commercially available
15 design, suitable for being powered by battery 22 or cells (not shown) provided in accordance with the foregoing description of various embodiments. Control button 66 may optionally initiate operation of FM receiver 52 so that it sends FM-demodulated signals to the discriminator
20 and microprocessor circuits 60 that may be configured to respond accordingly either to photosensor 30 or to FM receiver 62 according to whether update button 56 is pressed. The FM receiver 62 alternatively be any type of RF antenna that is of the size and accordance with the
25 invention, such that the discrimination may take place on a decoder; and the results are sent to the hand-held device 12 via RF.

Hand-held device 12F may be sports device operating otherwise according to version 12S described in relation
30 to FIG. 13, but the addition of FM receiver 62 gives the new device the capability of being used in sports stadiums and other performance venues where video signals are not available. Thus, the device 12 may receive either optical signals or electrical signals. In the
35 case of a sports device according to FIG. 13, the user may as described above receive statistics about a player depicted on the device, or about a player at bat.

According to a preferred method of using device 12F, the same auxiliary information as would be transmitted via a television broadcast for being received on a display device 10, there to be displayed as composite video signals, is in addition transmitted by low-power FM signals in the FM broadcast band of 88-108 MHz. For this purpose, FM receiver 62 may be pretuned to an appropriate frequency for such low-power signals. The FM signals may include batter statistics, for example, as batters come to bat, so that holders of the new devices 12F may update their devices as their preferred batters come to bat.

Hand-held devices 12 may have use in various sports events, entertainment presentation, conventions, museums, tours, and guided events at which holders of devices might not conveniently use them while in the presence of a television display carrying auxiliary data, but where the location in which the devices will be used will permit low-power FM or other RF signals. Other commercially significant usage of the devices of FIG. 14 can be made, similar to the methods of using the previously described versions. Similarly, devices of the invention may be adapted to receive AM signals, or auxiliary light signals such as IR (infrared) light signals, different from the composite video signals.

Similarly, hand-held devices 12 of the invention, whether or not sized as "cards", PDAs, or cell phones or other conveniently hand-held size, and whether in the form of racing devices, may simulate other objects, vehicles, personalities, or devices for house-hold, personal or business use, so as to provide a verisimilitude or facsimile representation of such devices or usage, so that the hand-held device suggests to the user the manner of its use, or conveys to the users special feeling, sense, identity or association with a field, activity, sport, entertainment or other use of the device it represents. In games, for example, in which some or all of the information content useful in

the game may be provided by auxiliary data, hand-held devices of the invention configured to provide a verisimilitude or facsimile representation of such devices or usage may give players of the game enhanced
5 sense of play, participation or gaming identity. The foregoing are merely illustrative of the many possibilities.

When used in a system for deriving benefit from encoded data including means for producing video signals
10 modulated with auxiliary data, such as by providing commercially sponsored television programming including auxiliary data, new hand-held devices of the invention have special impact for television response, advertising and promotions, as the new system and devices are useful
15 in providing, among others, the following commercially advantageous results when they are distributed to viewers and used by viewers to receive auxiliary data transmitted with normal programming content, which may include advertising, promotions and other sponsored transmission.

20

A method for card redemption is described in the context of an optically loaded card, however, such a method could also be employed with other cards that have coupon redemption requirements. The components of an
25 electronic couponing card which support the method for card and value redemption include:

- 1.) LCD or other human readable method to display data.
- 2.) On board computation to sequence the logic
30 defined below.
- 3.) A method to load "electronic coupon" information onto a card.
- 4.) Buttons or other method (such as a touch screen) to sequence through the coupons loaded on
35 the card.
- 5.) Button or other method (such as a touch screen) to put the card in "redeem" mode.

6.) Laser detection hardware described below.

Presently, most POS systems use a computerized cash register tied to inventory management software and bar code scanning hardware. One embodiment of a method of using an electronic coupon card and existing hardware and software located at a POS for electronic coupon redemption is described in the following steps:

- 1.) Coupon data is encoded onto a video signal, e.g. television signal. The encoded data would also contain additional text describing the coupon along with a numeric code to be entered at the POS.
- 2.) The user points the multi-use card at the television screen when the television signal containing the coupon data is airing. The electronic coupon data is then captured by the card by optically receiving the data that is presented on the display. The coupon data could also be captured with methods other than optical detection, including but not limited to radio frequency (RF) or hard-wired electronic data transfer.
- 3.) After capturing the electronic coupon data, the user can then view coupon information such as requirements, valid dates, valid POS locations, etc. on the LCD of the card. (Other numeric codes described in the following steps that are used for identification and security purposes are not available for viewing by the user at this time).
- 4.) When the user desires to redeem the electronic coupon, the card is transported to a POS and the user buys the desired item or otherwise follows the requirements of the coupon offer.
- 5.) At the check out, the cashier takes the card and locates the correct coupon using the scrolling function (usually a button) of the card, in concert with viewing the data on the LCD screen.

- 6.) The cashier then presses the required "redeem" button on the card. The cashier then has approximately one minute to complete steps 7 and 8 below. Requiring this button to be pressed reduces the likelihood that a coupon will be accidentally redeemed through bright ambient light.
- 7.) When the correct coupon is located, the card is held with the LCD screen facing the cashier and the back of the card facing the bar code scanner located near the cashier. The bar code scanner is the same scanner that is used for purchases and conventional paper coupon redemption.
- 8.) When the scanning laser light is detected by the card, the card beeps and the numeric code described in step #1 is displayed on the LCD screen. In addition, another code that represents the serial number of the card is also displayed. The second number displayed could also be a special code generated as a combination of the downloaded numeric value (step #1) and a hidden internal (to the card) serial number. The second number can be generated by various standard encryption methods and could be used to increase the security of the transaction because it would uniquely identify the card and transaction but would not be easily duplicated.
- 9.) The cashier then has 30 seconds to enter either the numeric code only or both the numeric code and card serial number (for greater security). After 30 seconds, the card automatically erases the coupon. The coupon may also be erased quickly by a press of the "redeem" or "scroll" keys during the 30 second period. (The scroll key is used to allow multiple coupons to be located and redeemed efficiently as described below).
- 10.) If additional coupons are to be redeemed at the same time, the above steps are completed for the

first coupon. Additional coupons are redeemed with the cashier repeating steps 5 through 9 above.

In an alternative embodiment, steps 8, 9, and 10 are replaced with the following steps:

8'.) When the scanning laser light is detected by the card, the card beeps and displays a numeric code, or alternatively an alphanumeric message, on the LCD screen. In addition, another code that represents the serial number of the card is also displayed. The second number displayed could also be a special code generated as a combination of the downloaded numeric value (step #1) and a hidden internal (to the card) serial number. The second number can be generated by various standard encryption methods and could be used to increase the security of the transaction because it would uniquely identify the card and transaction but would not be easily duplicated.

9'.) The cashier, upon viewing the number code or alphanumeric message, can determine whether or not the triggered card is the card that was pre-selected to win a prize or to receive a special value or discount. If the card alerts the cashier that a prize has been won, the cashier may optionally enter the second number (step #8b) into a database to verify that the card has not been tampered or altered. The prize may also be erased quickly by a press of the "redeem" or "scroll" keys during the 30 second period. (The scroll key is used to allow multiple prizes to be located and redeemed efficiently as described below).

The following describes how detection of a laser scan across the card can be accomplished: Almost all bar code scanning devices use a red laser of either the helium neon (HeNe) or diode types. The scanners deliver an extremely bright light in the 832.8 nanometer (nm)

wavelength for the HeNe or 640nm wavelength for the diode lasers. The wavelength spread for a laser is extremely small, which allows for narrow optical filters so that non-laser ambient light can be filtered out. A simple
5 electronic/optical circuit is shown in Fig. 17 and can be used to detect the signal.

As shown in Fig. 17, electronic/optical circuit 100 includes optical filters 120a and 120b, load resistor 140, microprocessor trigger 160, and phototransistor 180.

10 Optical filters 120a and 120b are used to prevent the electronics of the card from being triggered by ambient light, e.g. bright sunlight. Optical filter 120a is a neutral density type to reduce the intensity of light and optical filter 120b is a red bandpass type.

15 A photodetector is required to detect the laser light. This detector can be phototransistor 180 since only an ON/OFF signal is required. Phototransistor 180 has a small resistive load on it, as represented by load resistor 140 so that phototransistor 180 is less
20 sensitive to light. Load resistor 140 therefore reduces unwanted triggering.

The output of electronic/optical circuit 100 is fed into a microprocessor on the card where the output then becomes the trigger that causes the beep, etc. as
25 described in the above steps.

In view of the foregoing description of the present invention and practical embodiments it will be seen that the several objects of the invention are achieved and other advantages are attained. The embodiments and
30 examples were chosen and described in order to best explain the principles of the invention and its practical application to thereby enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the
35 particular use contemplated.

As various modifications could be made in the constructions and methods herein described and

illustrated without departing from the scope of the invention, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative rather than
5 limiting.

The breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with claims of the application and their
10 equivalents.

The present system and hand-held devices useful in the system may be for these purposes distributed by various business entities, which may include not only the sponsor of a program, event, or other sponsored
15 transmission, but may also include various businesses, services and organizations having commercial relationships with the sponsor. Viewer's use of the new devices of the invention accordingly provide commercially advantageous results relating to television advertising, promotions and other sponsored transmissions, wherein new
20 system and devices and their use is effective to:

- Attract viewer attention to advertising, promotions and other sponsored transmissions
- Effectively increase awareness and retention of message
25 and product
- Induce viewers to respond and take action after viewing to sponsored transmissions
- Differentiate a sponsor's product or service from those of competitors.
- 30 • Stimulate viewers to desire to watch advertising, promotions and transmissions.
- Provide a novel, cost-effective, brand efficient, and enjoyable medium for enhancing advertising, promotions and other transmissions
- 35 • Cause advertising, promotions and transmissions to take on special event significance

- Build customer traffic in places of business or points of sale associated with sponsors of advertising, promotions and other transmissions
- Increase consumer loyalty to sponsors of advertising, promotions and transmissions
- Increase viewer involvement in sponsored advertising, promotions and transmissions
- Cause viewer retention of sponsor identity and advertising or promotional content
- Enhance sales volume resulting from the sponsorship of advertising, promotions and transmissions
- Provide lasting value to sponsored advertising, promotions and transmissions
- Provide enhanced viewer/spectator involvement in sporting and racing events
- Afford viewers of television programming an opportunity to interact meaningfully with programming content and with advertising, promotions and transmissions.
- Enhance viewer good-will relative to advertising, promotions and events.
- Cause development of still other opportunities for interactive use of the devices.

* * * * *

In view of the foregoing description of the present invention and practical embodiments it will be seen that the several objects of the invention are achieved and other advantages are attained. The embodiments and examples were chosen and described in order to best explain the principles of the invention and its practical application to thereby enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated.

As various modifications could be made in the constructions and methods herein described and

illustrated without departing from the scope of the invention, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative rather than
5 limiting.

The breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their
10 equivalents.

What is claimed is:

1. A system for deriving benefits from auxiliary data in
5 video signals by use of a hand-held device responsive to
auxiliary data, said system carrying out the steps of:

modulating video signals to carry the auxiliary data;

10 providing the user with means of responding to the
auxiliary data received on the hand-held device;

determining that the video signals contain the auxiliary
data;

15 providing a benefit from the receipt of the auxiliary
data.

2. A system as set forth in claim 1, wherein the method
20 of determining that the video signals contains auxiliary
data is by:

receiving the video signals on a decoding box;

25 causing the decoding box to electronically determine
whether the video signals contain the auxiliary data; and

transferring the auxiliary data from the decoding box to
the hand-held device.

30 3. A system as set forth in claim 1, wherein the method
of determining that the video signals contain auxiliary
data is by:

35 receiving the video signals on the hand-held device; and

causing the hand-held device to electronically determine

whether the video signals contain the auxiliary data.

4. A system as set forth in claim 2, wherein the
receiving of the video signals on the decoding box is
5 through hardwiring or optics.

5. A system as set forth in claim 2, wherein the
decoding box is a sleeve, a cradle, a remote control, or
a docking station.
10

6. In a system utilizing a hand-held device for deriving
benefit from a production of composite video signals
carrying auxiliary data, a system comprising:

15 means for receiving the composite video signals,

means for determining whether the auxiliary data is
present in the composite video signals,

20 means for processing the auxiliary data when present, and

means for providing indicia of the auxiliary data is
present by which a user of the hand-held device may
receive tangible benefits according to content of the
25 encoded data when present.

7. In a system as set forth in claim 6, the hand-held
device further comprises means on the hand-held device
for storing the auxiliary data and for displaying at
30 least a part of the auxiliary data as said indicia.

8. In a system as set forth in claim 6, the hand-held
device further comprises means for transferring at least
a part of the auxiliary data or composite video signals
35 to a computer.

9. In a system as set forth in claim 6, wherein the

auxiliary data is provided at a rate which is a function of normal horizontal retrace frequency of a display by which the normal programming content is displayed.

5 10. In a system as set forth in claim 9, wherein the means for electronically determining whether the auxiliary data is present in the composite video signals comprises a discriminator circuit of the hand-held device responsive to both signals at the normal horizontal
10 retrace frequency and signals at a function of the normal horizontal retrace frequency and discriminating between such signals according to their relative magnitude.

11. In a system as set forth in claim 8, wherein a
15 discriminator is implemented by the computer, the discriminator generally to discriminate between the auxiliary data and signals normally characteristic of the composite video signals.

20 12. In a system as set forth in claim 6, wherein the means for receiving auxiliary data on the hand-held device comprises a photosensor and circuit means for providing an amplified and conditioned output of the photosensor to the discriminator.

25 13. In a system as set forth in claim 6, further comprising an FM receiver of the hand-held device for receiving FM transmissions providing the same content as the composite video signals when composite video signals
30 cannot be received by the hand-held device.

14. In a system as set forth in claim 13, further comprising means for selectively initiating operation of the FM receiver when composite video signals cannot be
35 received by the hand-held device.

15. In a system as set forth in claim 6, wherein the means for providing indicia of the auxiliary data is present comprises at least one display on the hand-held device.

5

16. In a system as set forth in claim 6, wherein the hand-held device comprises an instrument of approximately credit-card or wallet size.

10 17. In a system as set forth in claim 6, wherein the hand-held device comprises an instrument of approximately mobile phone or PDA size.

15 18. A system as set forth in claim 6, wherein the display comprises any number of light emitting display devices.

19. A system as set forth in claim 6, wherein the display comprises an alphanumeric display visible on a surface of the hand-held device.

20 20. In a system as set forth in claim 6, wherein the means for providing indicia of the encoded data is present comprises at least one audio transducer of the hand-held device.

21. In a system as set forth in claim 6, the hand-held device further comprises an aiming light which turns on to notify user when video signals are being received by the hand-held device.

22. In a system as set forth in claim 6, the hand-held device further comprises an activation control selectively operable to activate the hand-held device for operation.

23. In a system as set forth in claim 6, the hand-held

device further comprises a reset control selectively operable to reset the hand-held device for further operation.

- 5 24. A system for deriving benefit from auxiliary data in modulated video signals by use of a hand-held device responsive to the auxiliary data, said system carrying out the steps of:
- 10 modulating video signals to carry auxiliary data to a location of a user by means of a display device;
- receiving the video signals by means of the hand-held device;
- 15 determining whether the video signals contain auxiliary data;
- providing a benefit to the user resulting from
- 20 electronically determining that the video signals contains the auxiliary data.
25. A system as set forth in claim 24, further comprising transferring the auxiliary data through a
- 25 transfer interface to a computer or computer-like device after determining whether the video signals contain auxiliary data.
26. A system as set forth in claim 24, further
- 30 comprising transferring the auxiliary data through a transfer interface to a computer or computer-like device before determining whether the video signals contain auxiliary data.
- 35 27. A system as set forth in claim 24, wherein the method of modulation auxiliary data utilizes the vertical blanking interval (VBI), luminance/chrominance

modulation, signal replacement, signal addition, and/or separate signal.

28. A method of video interactive advertising and
5 promotion, comprising

transmitting auxiliary data by television together with
normally visible television programming content, where
the auxiliary data is associated with a sponsor and
10 carries information of special significance relative to
the sponsor and of special value to television viewers,

distributing interactive devices of hand-held character
to television viewers for their use, the devices being
15 capable of selectively receiving the auxiliary data,

providing incentive for viewers to use the interactive
devices for selectively receiving and decoding the
auxiliary data by rewarding the viewers with the
20 information of special value, the interactive devices
being capable of retaining indication of having received
the information, and

providing redemption of the special value for users at a
25 redemption site where users may present the interactive
devices.

29. A method of interactive advertising and promotion in
connection with a sports event or other special event,
30 comprising

transmitting auxiliary data by television together with
normally visible television programming content related
to such event, where the auxiliary data is associated
35 with a sponsor and carry information special significance
relative to the event, the sponsor and are of special
value to viewers,

providing means for television viewers to use a hand-held device at an event for their use, the devices being capable of selectively receiving the auxiliary data, and

5

providing incentive for viewers to use the hand-held devices for selectively receiving the auxiliary data by rewarding the viewers with the information of special value, the interactive devices being capable of retaining indication of having received the information, and

10

using the devices to display for the benefit of users information received by means of the auxiliary data.

15 30. A method of interactive advertising and promotion in connection with a sporting, racing, or other special event, comprising

transmitting auxiliary data by television together with normally visible television programming content related to such event, where the auxiliary data is associated with a sponsor and carry information special significance relative to at least one of the participants in the event, the sponsor and are of special value to viewers,

25

providing means for television viewers to use a hand-held device at an event for their use, the devices being capable of selectively receiving the auxiliary data, and

30 providing incentive for viewers to use the interactive devices for selectively receiving and decoding the auxiliary data by rewarding the viewers with the information of special value, the interactive devices being capable of retaining indication of having received the information, and

35

using the devices to display for the benefit of the users information received by means of the auxiliary data.

31. A method of using auxiliary data if present with
5 television programming normally viewable by television viewers, where the auxiliary data is transparent to the viewers may accompany the television programming, displaying the television programming on a display device, receiving light signals from the display device
10 by use of a hand-held device where the light signals include auxiliary data if present, by photosensing the light signals at the hand-held device, filtering and amplifying the light signals within the hand-held device, using a discriminator within the hand-held device to
15 determine whether the auxiliary data is present in the amplified light signals, and providing the auxiliary data for further use by the hand-held device.

32. A method of using auxiliary data according to claim
20 31 including the steps of providing the auxiliary data to a microprocessor of the hand-held device and displaying information content of the auxiliary data by means of a display of the hand-held device in response to operation of microprocessor.

25 33. A method of using auxiliary data according to claim 31 wherein the display is an alphanumeric display or one or more a light-emitting display devices.

30 34. A method of using auxiliary data if present with television programming normally viewable by television viewers, where the auxiliary data is transparent to the viewers and may accompany the television programming, receiving modulated video signals from the display device
35 by use of a decoder box where the video signals include auxiliary data if present, filtering and amplifying the light signals within the decoder box, using a

discriminator within the decoder box to determine whether the auxiliary data is present in the amplified light signals, and providing the auxiliary data for further use by the hand-held device.

5

35. A method for viewing Internet websites, comprising producing video signals encoded with auxiliary data at a location of a user by means of a hand-held device, comprising:

10

providing the user with the means on a hand-held device for receiving the video signals;

receiving the auxiliary data by means of the hand-held device;

15

transferring said auxiliary data through a connection from the hand-held device to a computer; and

utilizing the auxiliary data on the computer.

20

36. The method of claim 35, wherein utilizing the auxiliary data on the computer is constituted by executing a computer program on the computer.

25

37. The method of claim 35, wherein utilizing the auxiliary data on the computer is locating an Internet website from the indicia of the auxiliary data.

30

38. A method of providing improved advertising opportunities in a movie theater by the use of a hand-held device by a movie patron, said method comprising:
entering a movie screening area by the movie patron;
receiving auxiliary data on a hand-held device;
recording a response by the movie patron to the received auxiliary data; and

35

processing the response.

39. An electronic multi-use card for the redemption of electronic coupons and value, said electronic multi-use card comprising:
- a microprocessor embedded in said card;
 - memory electronically connected to said microprocessor;
 - visual display electronically connected to said microprocessor and said memory;
 - user interaction means electronically connected to said microprocessor, said memory, and said visual display;
 - a photodetector, said photodetector electronically coupled to said microprocessor and said memory, said photodetector capable of detecting light from a conventional bar code scanner; and
 - laser detection triggering means electronically coupled to said photodetector.
40. A method for the redemption of electronic coupons and value, said method comprising the steps of:
- providing an electronic multi-use card, said electronic multi-use card having a visual display means and a photodetector;
 - pointing said electronic multi-use card at a video display;
 - reception of electronic value data by said electronic multi-use card from said video display;
 - storing of said electronic value data on said electronic multi-use card;
 - transporting said electronic multi-use card to a point of sale, said point of sale having a computer system;
 - viewing said electronic value data in said visual display means and simultaneously scanning said photodetector with a light scanner; and
 - entering said electronic value data into the

computer system of said point of sale.

FIG. 1

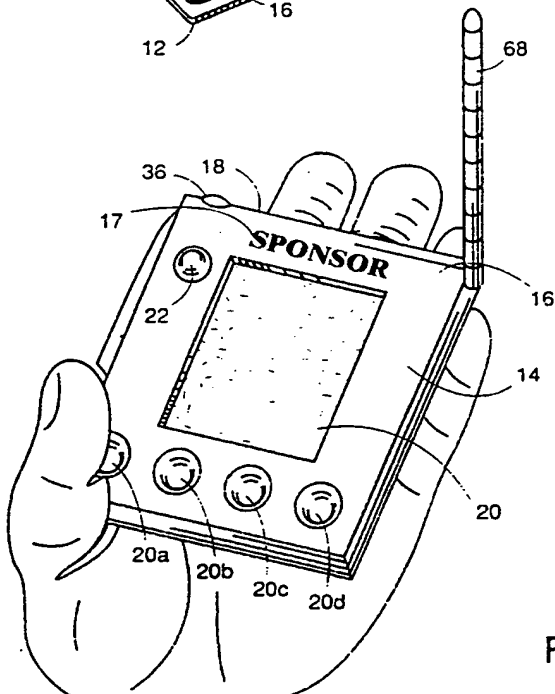
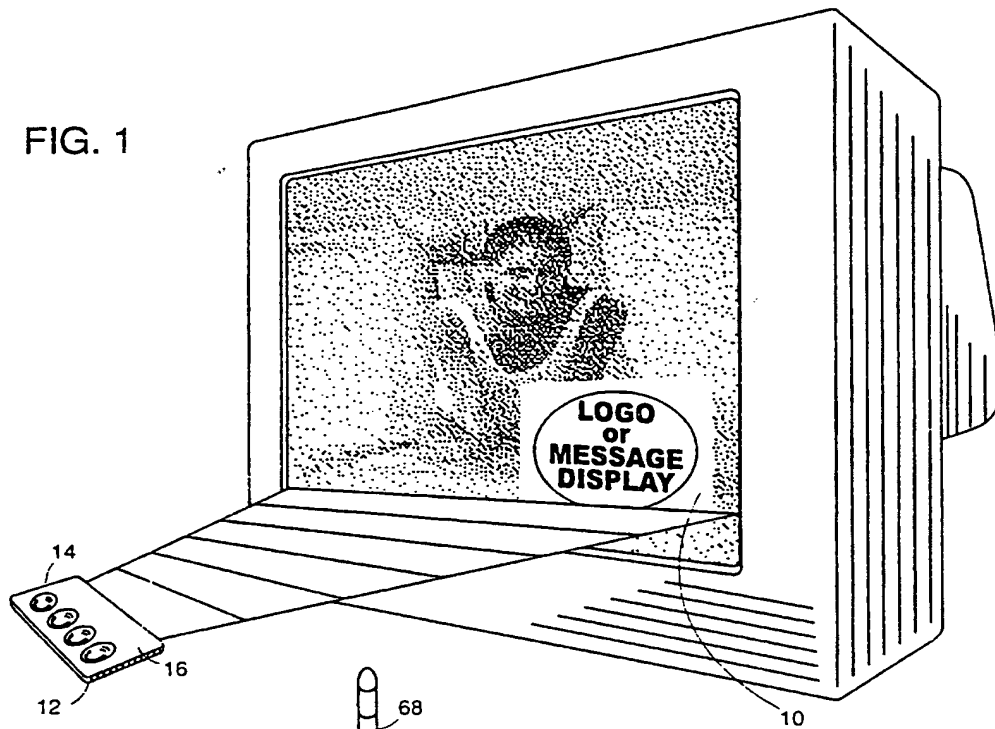


FIG. 2A

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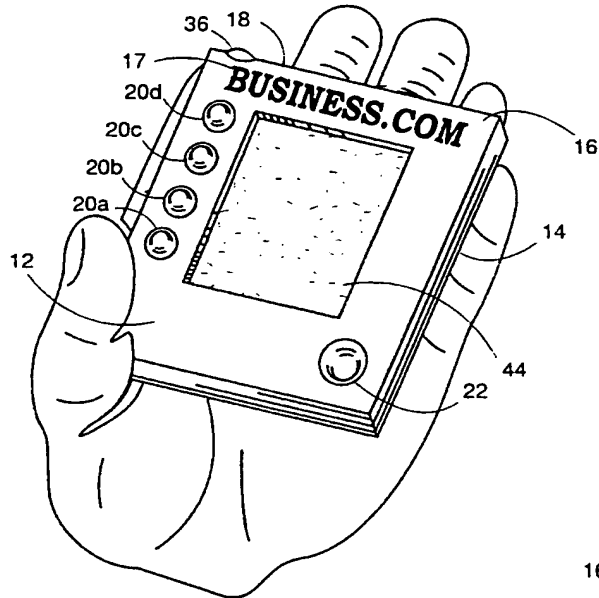


FIG. 2B

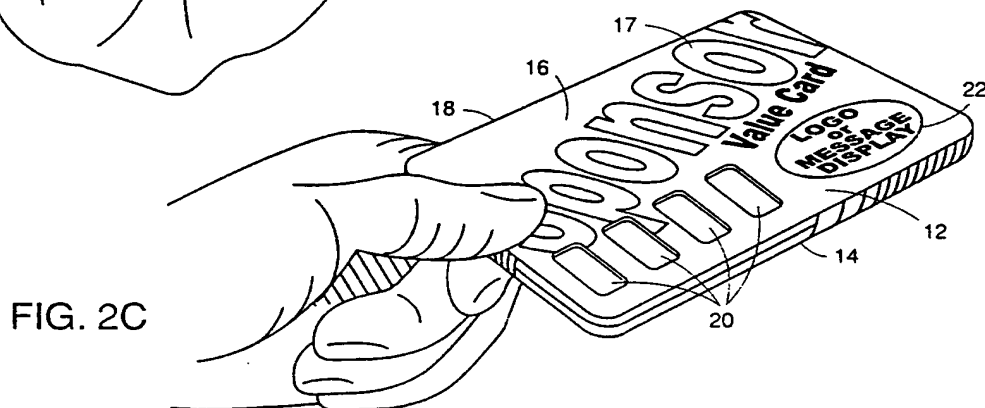


FIG. 2C

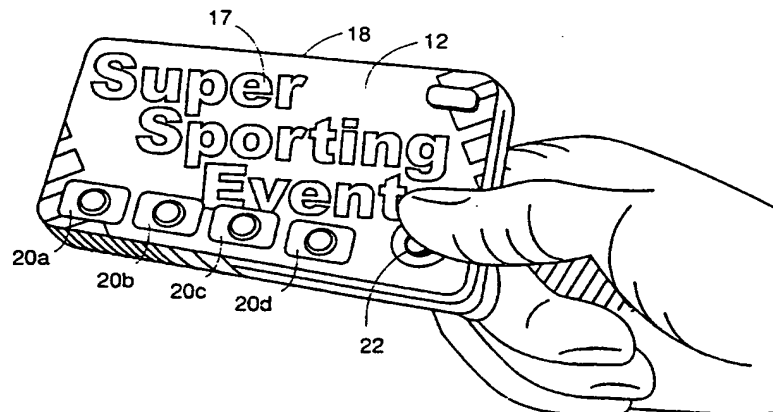
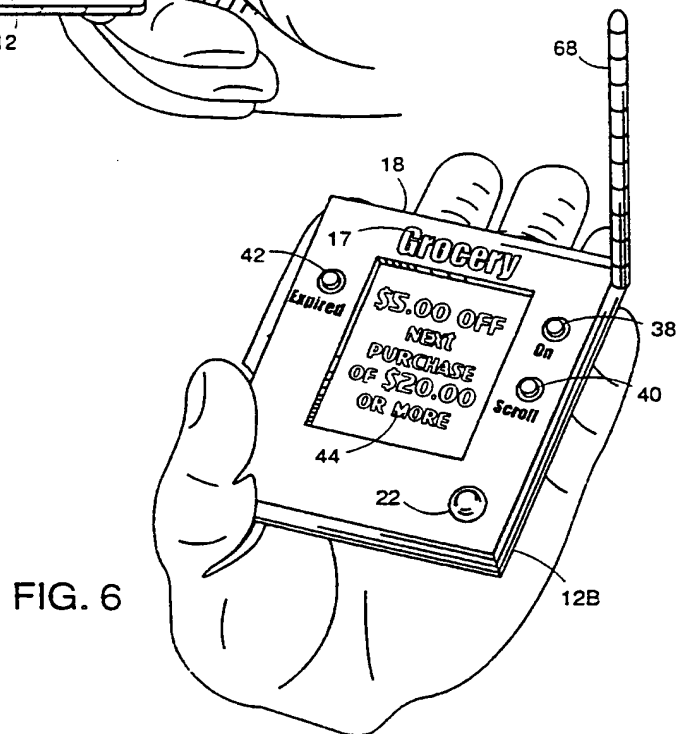
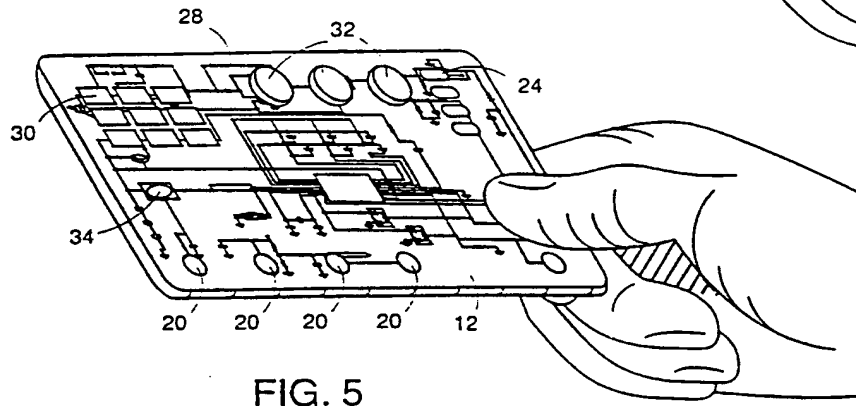
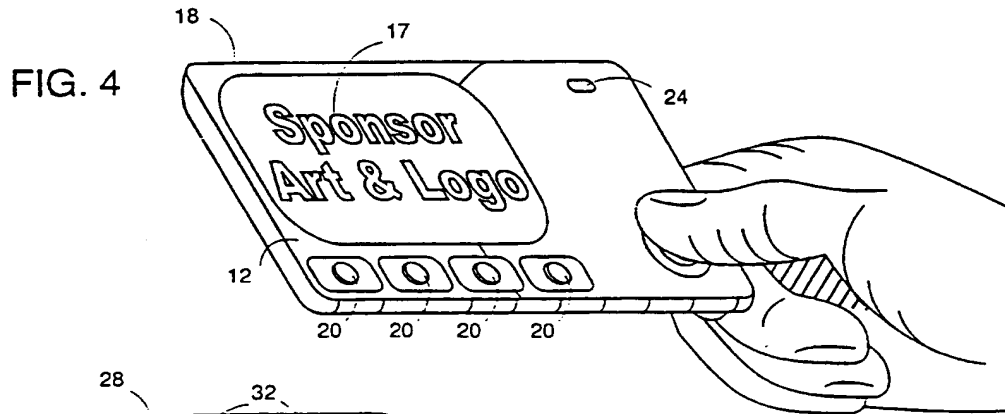


FIG. 3

SUBSTITUTE SHEET (RULE 26)



SUBSTITUTE SHEET (RULE 26)

Optical Receipt With PCMCIA Computer Connection

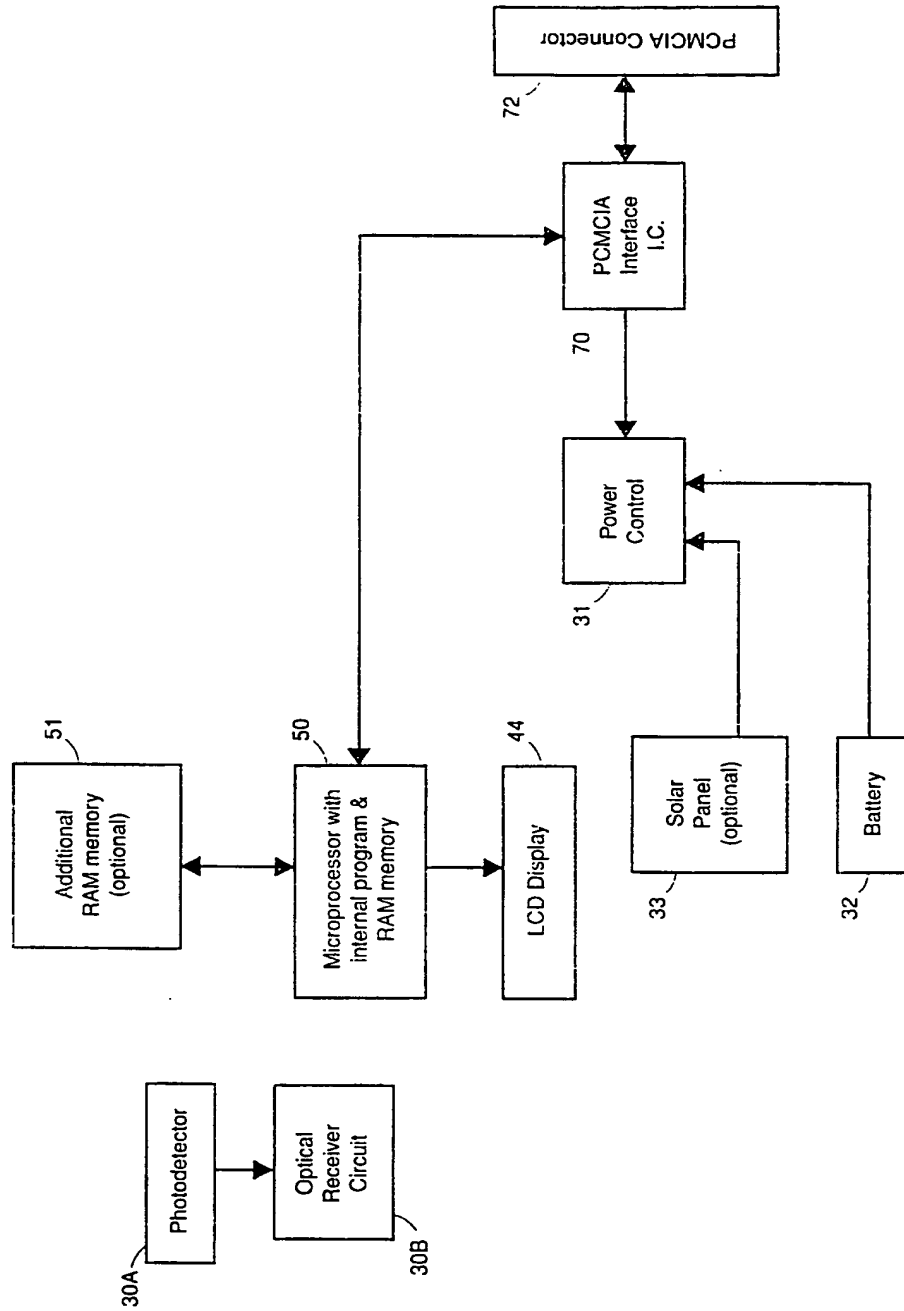


FIG. 8

Hard Wired Receipt With PCMCIA Interface – PCMCIA Card

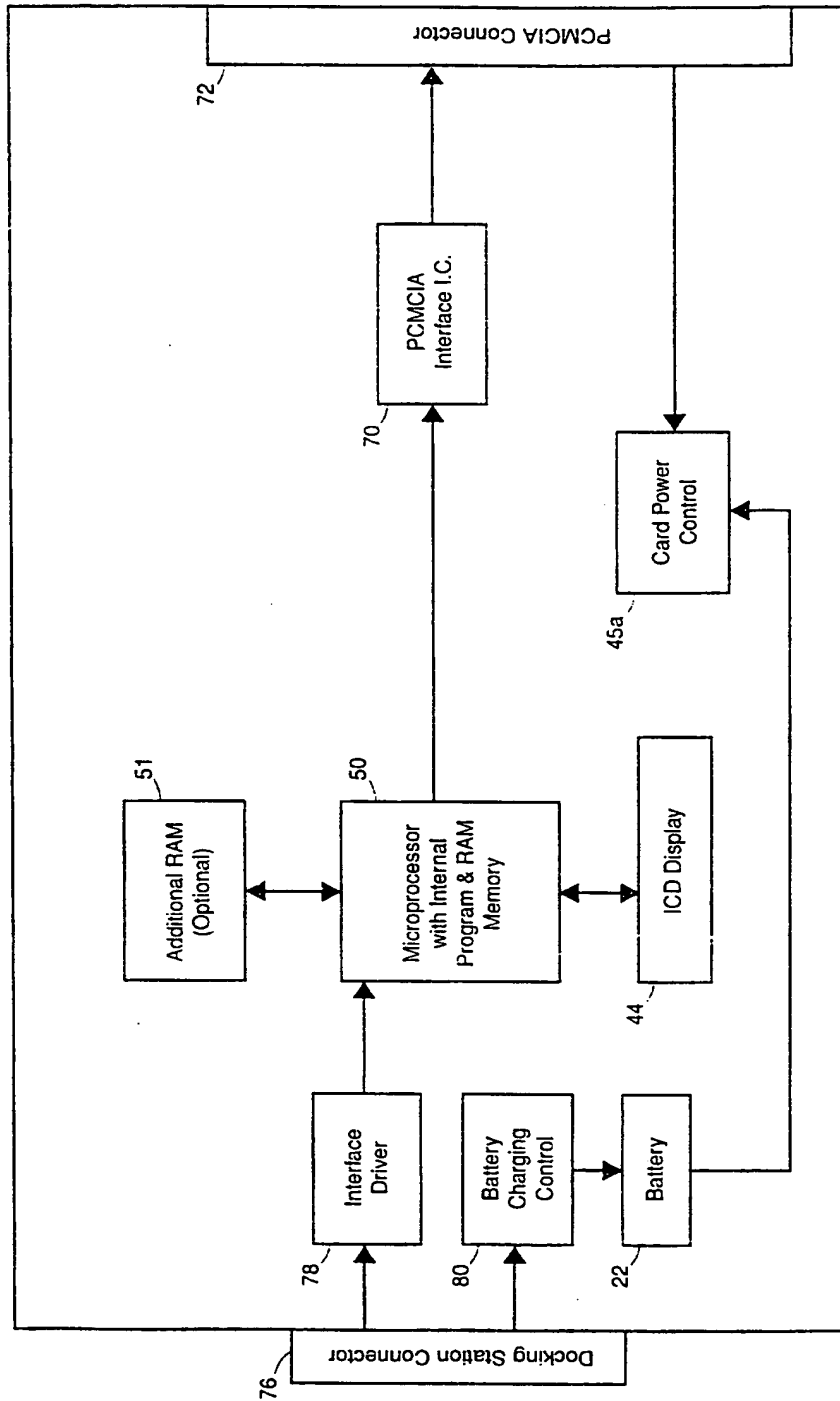


FIG. 9

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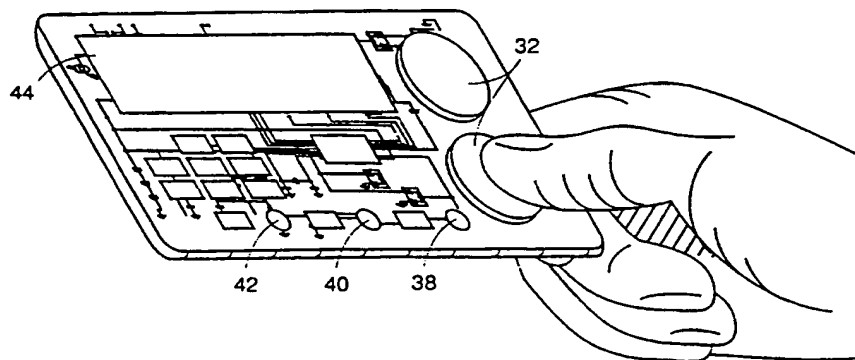


FIG. 7

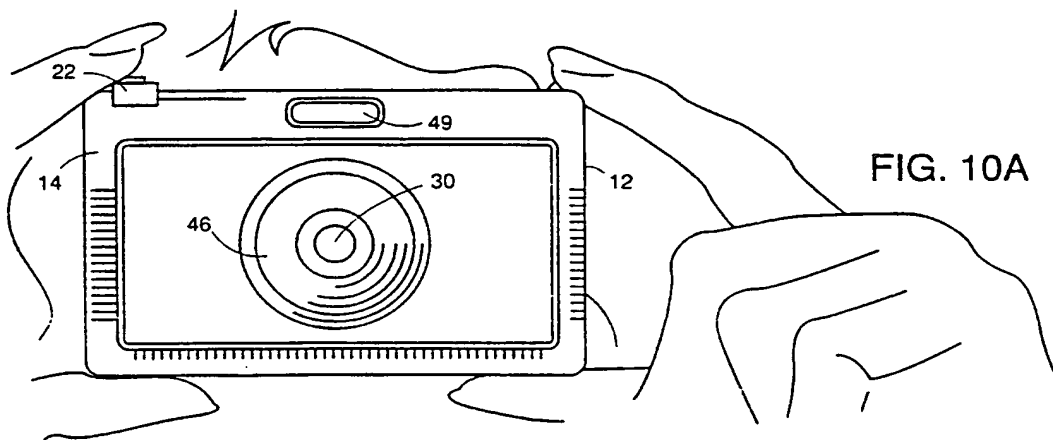


FIG. 10A

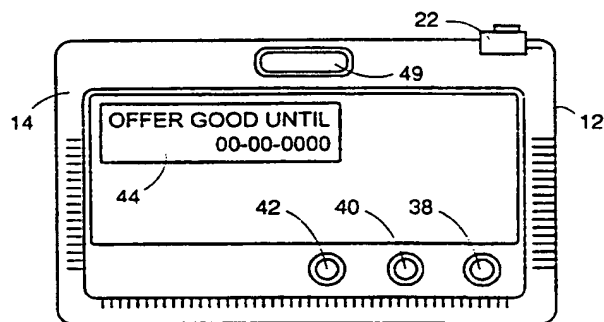


FIG. 10B

SUBSTITUTE SHEET (RULE 26)

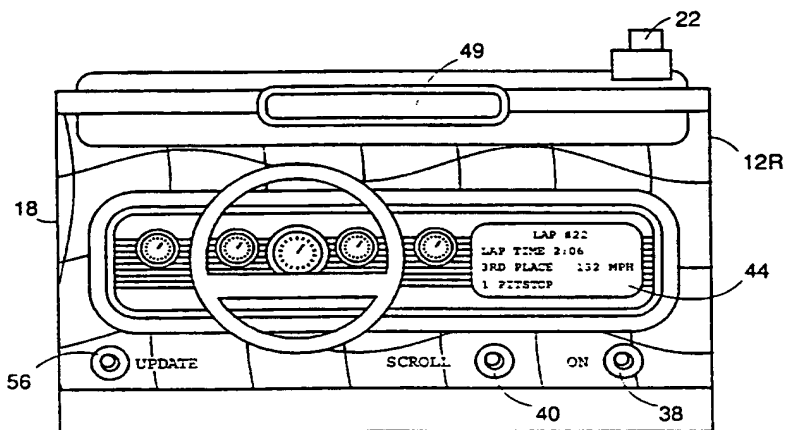


FIG. 11B

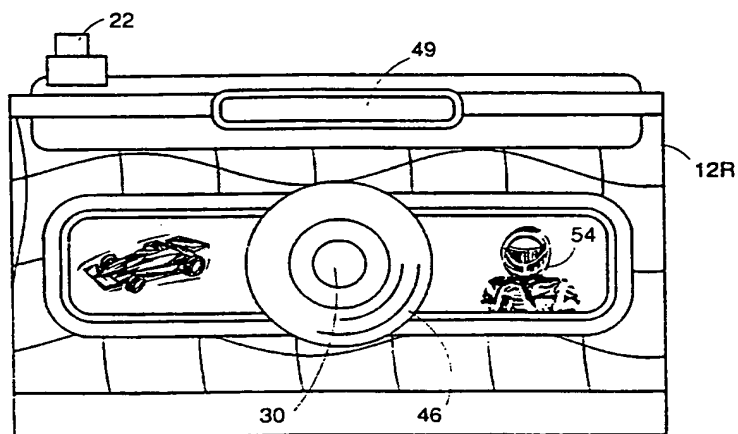


FIG. 11A

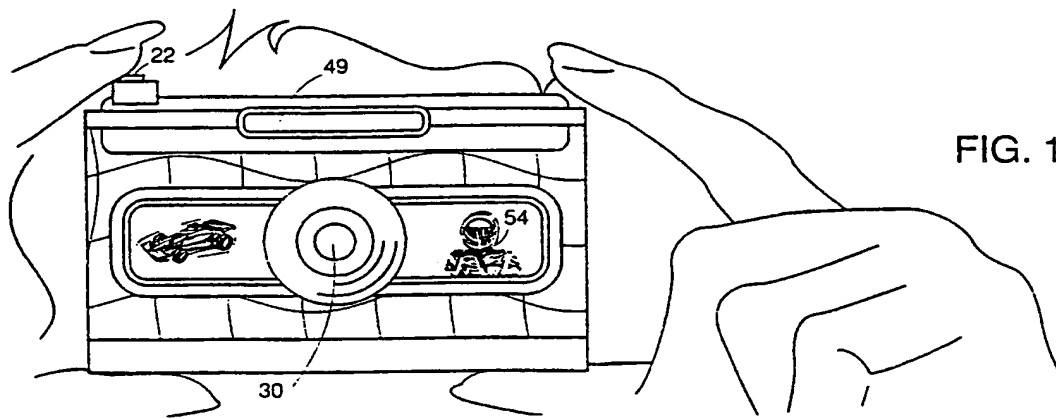
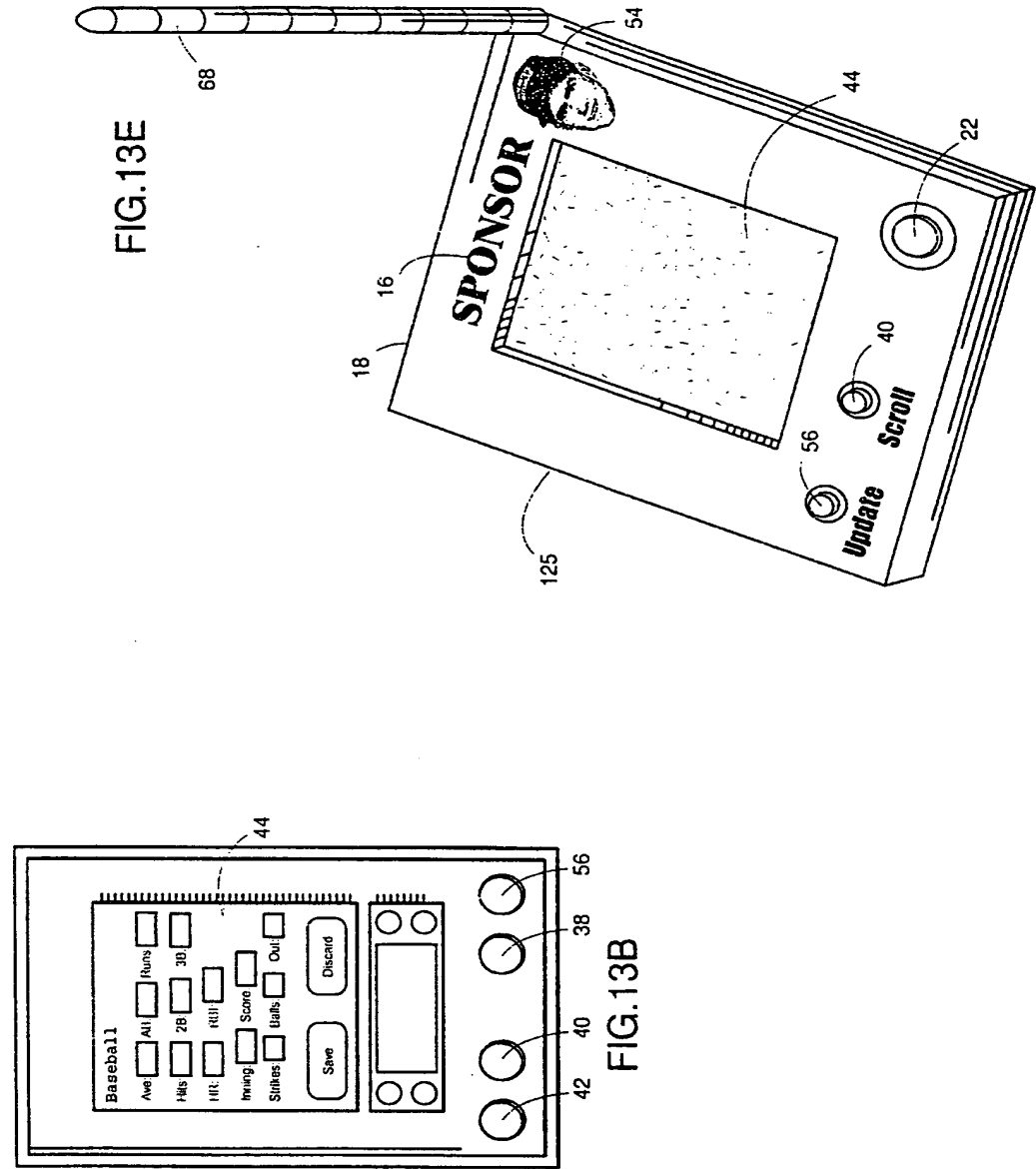


FIG. 11C

SUBSTITUTE SHEET (RULE 26)



SUBSTITUTE SHEET (RULE 26)

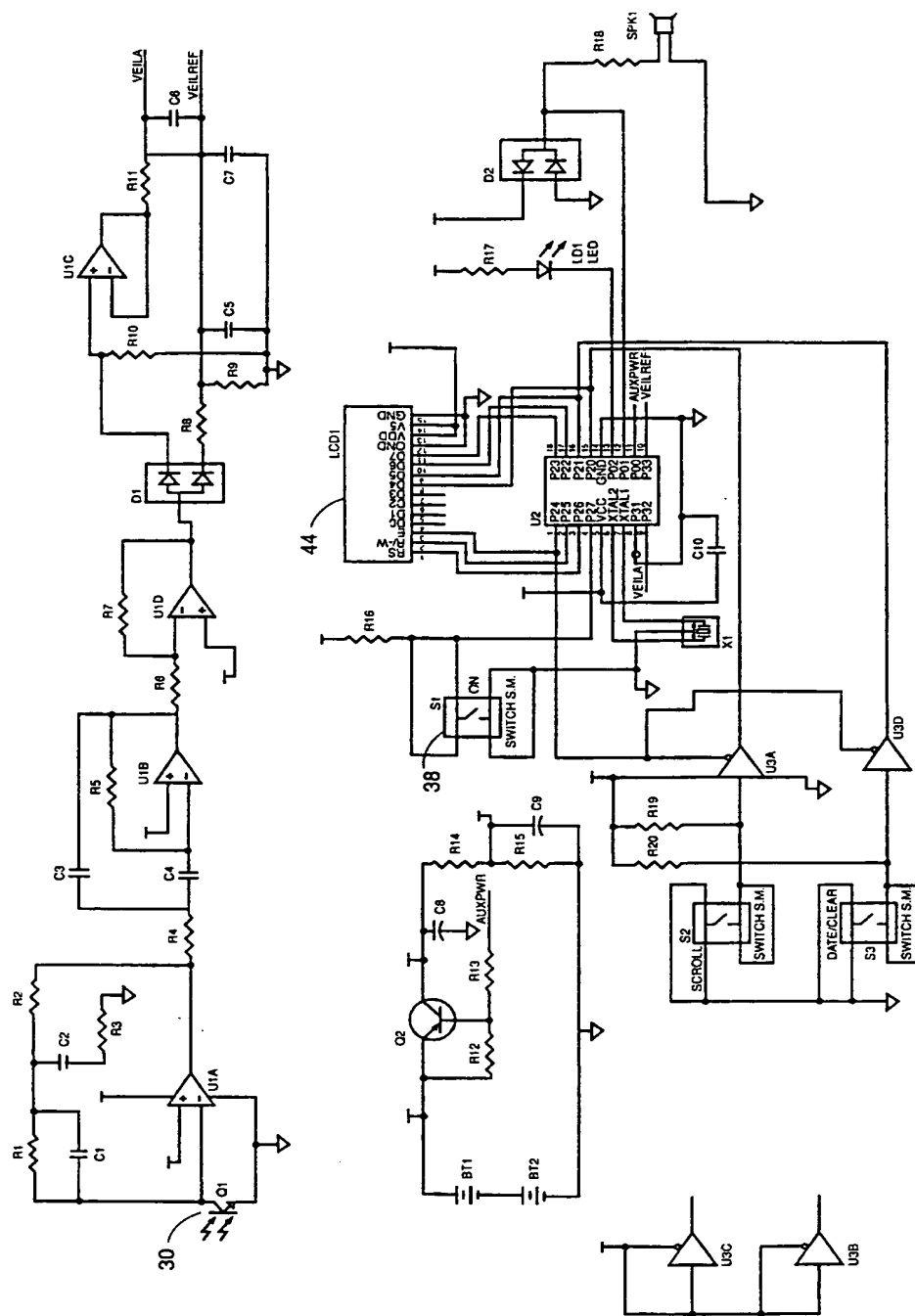


FIG. 15

SUBSTITUTE SHEET (RULE 26)

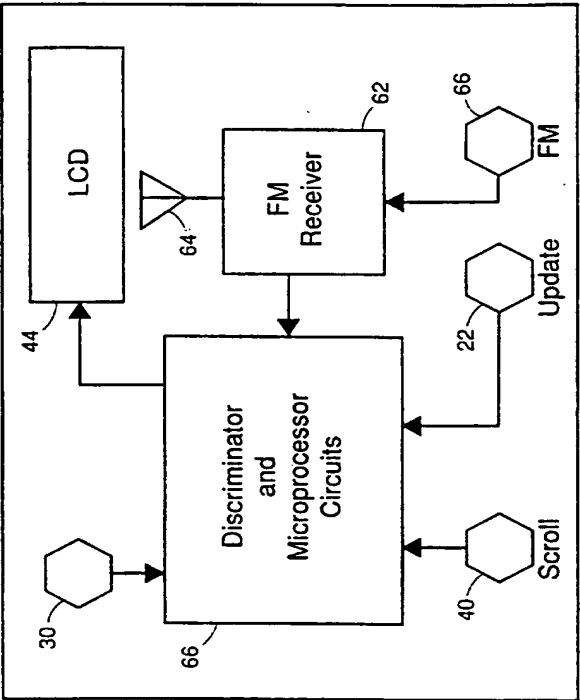


FIG.16

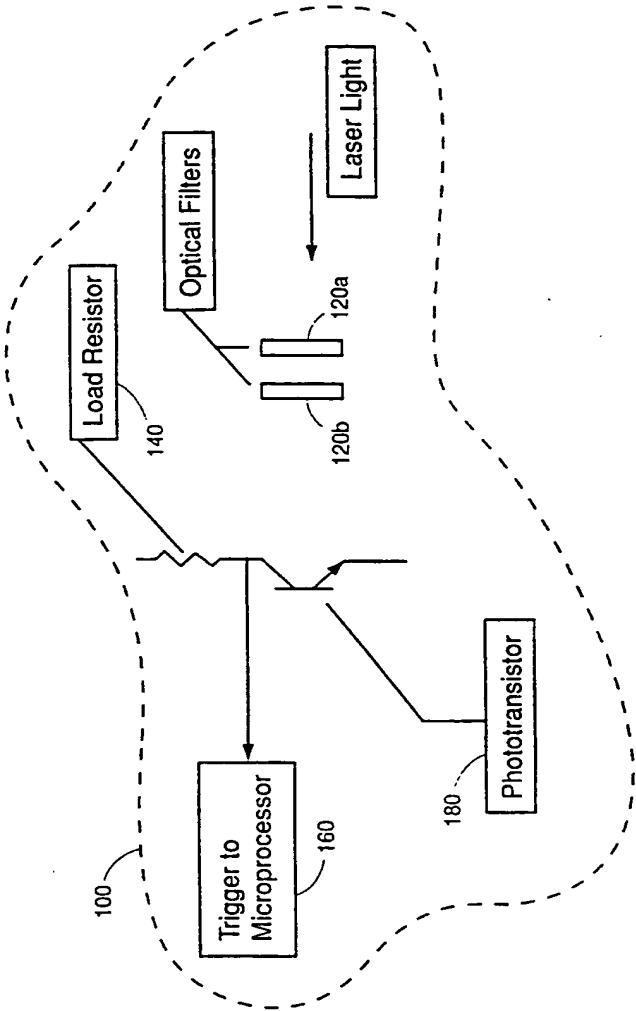


FIG.17

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/24386

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04N 7/173

US CL : 725/23

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)

U.S. : 725/23, 32-36, 135-142, 153; 345/327; 705/14; H04N 7/16, 7/173

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,767,896 A (NEMIROFSKY) 16 June 1998 whole document	1-40
X	US 5,523,794 A (MANKOVITZ et al.) 04 June 1996 whole document	1-40
X	US 5,249,044 A (VON KOHORN) 28 September 1993 whole document	1-40
A	US 5,500,681 A (JONES) 19 March 1996 whole document	1-40
A	US 5,488,423 A (WALKINGSHAW et al.) 30 January 1996 whole document	1-40

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "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 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "Z" document member of the same patent family	

Date of the actual completion of the international search 03 JANUARY 2001	Date of mailing of the international search report 22 JAN 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer CHRISTOPHER GRAY Telephone No. (703) 305-4755

Form PCT/ISA/210 (second sheet) (July 1998) *

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 November 2001 (08.11.2001)

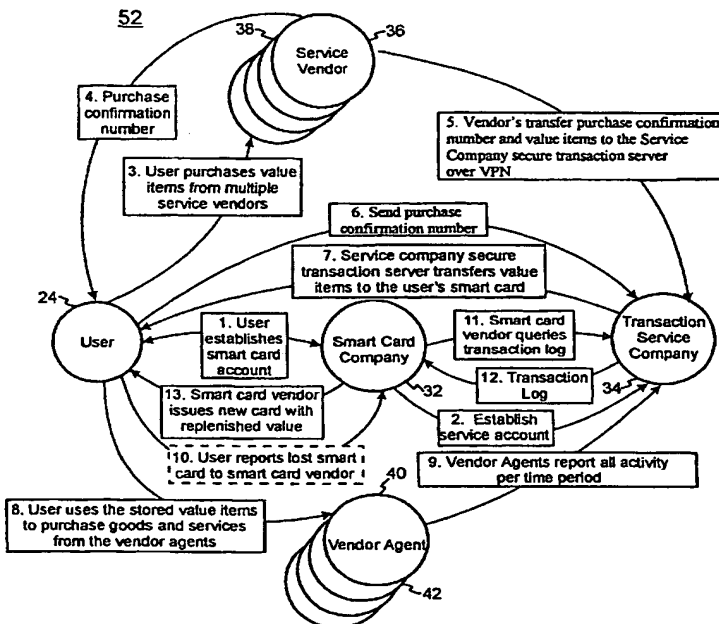
PCT

(10) International Publication Number
WO 01/84474 A2

- (51) International Patent Classification⁷: G06K 7/00 (74) Agents: NIXON, Dale, B. et al.; Sidley Austin Brown & Wood, Suite 3400, 717 N. Harwood, Dallas, TX 75201 (US).
- (21) International Application Number: PCT/US01/14058
- (22) International Filing Date: 1 May 2001 (01.05.2001) (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
09/562,795 2 May 2000 (02.05.2000) US
- (71) Applicants: CMA BUSINESS CREDIT SERVICES [US/US]; 40 East Verdugo Avenue, Burbank, CA 91502 (US). COCOTIS, Thomas, A. [US/US]; Apt. C, 17111 Ash Street, Huntington Beach, CA 92647 (US). VON KAENEL, Tim, A. [US/US]; 12 Lake View Drive, Coto de Caza, CA 92679 (US). (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: STORED ELECTRONIC VALUE METHOD FOR SMART CARDS



(57) Abstract: A smart card is used within a system for the loading of value items sold by vendors and for the purchase of goods or services from vendor agents. The user of the smart card purchases value items from multiple vendors who identify the transaction by a purchase confirmation number. The user logs onto a centralized transaction service company and submits through a secure channel the confirmation number. The service company then contacts the one or more vendors to obtain the value items electronically. These value items are then transmitted via the secure channel to the user for loading into the user's smart card. The user can then apply the value items at each of a plurality of vendor agents because each of the agents utilizes the same application program for reading and using the data on the smart card. The smart card itself has one universal application program with a data field that is divided into groups for each of the vendors who supply value items to the user. Each time the smart card is used, the value items removed are

reported back to the transactional service company for updating the account of the user. Should the smart card be lost, the service company can identify the remaining balance in the card and have remaining value unit items loaded in a replacement card that is provided to the user.

WO 01/84474 A2



Published:

— *without international search report and to be republished
upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

STORED ELECTRONIC VALUE METHOD FOR SMART CARDS

TECHNICAL FIELD OF THE INVENTION

The present invention pertains in general to electronic stored value systems and in particular to the storing and accounting of value in such systems.

5 BACKGROUND OF THE INVENTION

Smart cards have a processor and memory incorporated into a thin plastic device that is essentially the size of a credit card. These devices have highly developed security provisions to limit access to only those parties who are authorized to have access. Smart cards store value items electronically such that the user can purchase
10 goods or services by transferring electronic value from the card to the merchant or provider who can then redeem the electronic value for cash or other value. However, the limited memory available in smart cards restricts the extent of use of these cards because each independent application used by the cards requires a separate application program which consumes much of the card memory space and limits the memory
15 available for storing the data for defining value items.

A further problem is that the loading of value items into a smart card requires a highly secure communication channel requiring specialized software and procedures. The implementation of such software and procedures poses a substantial operating cost to each of the individual vendors of goods and services using smart card distribution.

20 A still further problem with the widespread implementation of smart cards is that the possibility of loss of theft of the card poses a detriment to the use of the cards. Since the value itself is stored on the card, a user could suffer a loss much like that of having cash stolen or destroyed. A primary advantage of credit cards is that the liability of the user can be limited so the user is encouraged to widely employ the card
25 for almost any kind of goods or services. Thus, there exists a need for a process to make possible the replacement of value in a lost or stolen smart card.

SUMMARY OF THE INVENTION

A selected aspect of the present invention for use of smart cards is the organization, programs and data in the smart card memory as well as application programs for the smart card. The memory structure in the smart card has a single
5 application program for storing and accessing a plurality of value units that are stored in the memory of the card. A data field comprises a plurality of groups of value units with each group corresponding to a different vendor for the value units. Each group of value units has an identification character for defining the vendor associated with the group. A further aspect is that each of the vendor agents which receive the value items
10 in return for goods and services utilizes a common algorithm in the application program for reading and operating the smart card, thereby making possible use of the smart card by an unlimited number of unassociated providers.

A further aspect of the present invention is directed to the loading of value items into a smart card. A plurality of vendors sell value items to users and these value items
15 are transmitted to a common secure server. This server establishes a secure communication channel to a processor which has the smart card connected thereto. The server then transmits the value items via the secured channel for loading into the smart card.

A still further aspect of the present invention pertains to the replacement of lost
20 or stolen smart cards. A smart card is loaded with a predetermined set of value items and a record of these value items is loaded into a secure server. The smart card is used at a venue and one or more of the value items is removed. A report of the value items removed is transmitted to the secure server. Upon receiving a request for a replacement card, a determination is made for the value items which have not been reported
25 removed from the smart card by use of the record of the items previously loaded and the list of removed items reported to the secure server. A replacement set of value items is then stored in a replacement smart card that is provided to the user.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings in which:

5 Fig. 1 is a schematic illustration of a network for utilization of the present invention showing a user, service vendors, a smart card vendor, a transaction services company and multiple venues for use of the smart card,

 Fig. 2 is a state diagram illustrating the dataflow and functions performed with respect to each of the entities shown in Figure 1,

10 Fig. 3 is a memory structure for a prior art smart card,

 Fig. 4 is a memory structure for a smart card as utilized in accordance with the present invention, and

 Fig. 5 is a schematic illustration of the application programs involved in the use of smart cards in accordance with the present invention.

15 **DETAILED DESCRIPTION**

 A "smart card" is a product having essentially the dimensions of a credit card but having fixed within the body of the card electronic circuitry generally including a microprocessor and memory. A representative embodiment of a smart card is described in U.S. Patent No. 6,050, 494 entitled "Smart Card", which is incorporated
20 herein by reference.

 A principle existing application for a smart card is to serve as a portable money transference device. A smart card is provided with very powerful security features to ensure that access to the device is limited only to those parties who are authorized to have such access. Monetary value is stored in a smart card in a secure fashion such that
25 the card can be presented to a merchant and the merchant can withdraw value from the card for the purchase of goods or services. The merchant can then electronically process the funds received to transfer them into its own account. The value stored on the card is reduced by the amount withdrawn by the merchant. The user of the smart card can return to a terminal connected to his bank and connect the smart card to the
30 terminal and command that additional value be transferred into the card from his

account. Since the smart card must be extremely small, and in particular, thin, there is only a limited amount of storage space on the card. The storage must be non-volatile because smart cards typically do not include a battery, but only obtain power when connected to a device for conducting a transaction.

5 A network 20 configuration for utilization of a smart card in accordance with the present invention is shown in Figure 1. The network 20 includes Internet 22 which provides communication between the various entities. A user 24 has a conventional personal computer 26 that is connected to the Internet 22. The user 24 is provided with a smart card 28 that can be inserted into a card reader 30 that is connected to the
10 computer 26. A smart card company 32 issues the card 28 and provides services with respect to this card. A transaction service company 34 is connected to the Internet 22 and provides services for use of the smart card 28. A service vendor 36 supplies value items that can be purchased by the user 24 and stored in the smart card 28. A service vendor 38 also provides value items for the smart card 28. The value items supplied by
15 the service vendorss 36 and 38 can be converted to goods or services by vendor agents 40 and 42, which have respective card readers 44 and 46 that are also connected to the Internet 22. The readers 44 and 46 include processors for interacting with the smart cards and communicating through the Internet 22.

The present invention is now described generally in reference to Figure 1, but is
20 described in more detail below in reference to Figures 2-5. The user 24 establishes an account with the smart card company 32, who then physically transfers the smart card 28 to the user 24. The company 32 also provides the user 24 with the card reader 30, which is connected to the computer 26 and operates by use of software provided by the company 32. The smart card company 32 establishes a service account for the user 24
25 at the transaction service company 34.

The user selects a service vendor, such as 36 and makes a connection between his computer 26 with the service vendor 36 through the Internet 22. The user selects certain value items such as a ticket, gift certificate, or other electronically storable value item from the service vendor 36. Payment can be made through a conventional credit
30 card payment or other means. The vendor sends a purchase confirmation number to the user. User 24 then logs onto the transaction service company 34 where an account has

been previously established. The user 24 establishes a secure communication channel with the transaction service company. The user sends to the transaction service company 34 the purchase confirmation number which was provided by the service vendor 36. The service vendor 36 sends the purchase confirmation number and the value items purchased by the user 24 to the transaction service company 34. The transaction service company 34 transfers these value items through the secure connection channel to the user computer 26 where the software within this computer loads the value items through the card reader 30 to the smart card 28.

An inventory of the value items for the user 24 is also maintained at the transaction service company 34. The user 24 can purchase value items from other vendors, such as 38, and these items are similarly transferred to the transaction service company 24 in a similar process for downloading to the smart card 28.

When the user 24 desires to use a value item stored on the card 28, he must physically take the card 28 to a vendor agent 40 where it is inserted into the card reader 44. The user enters a PIN number at the reader 44 and the value items for the vendor agent 40 are transferred from the card 28 to the vendor agent 40. This could, for example, be two tickets for admission to a concert. The vendor agent 40 then reports back at a maximum time period, such as 24 or 48 hours, to the transaction service company 34 providing information that specific tickets have been redeemed by the user 24. The service company 34 then updates the user 24 account to remove these tickets from the inventory for the user 24.

Should the user 24 lose the smart card 28, he can apply to the smart card company 32 for replacement. The smart card company 32 determines from the transaction service company 34 the content that is not been consumed for the account of the user 24. Smart card company 32 can then either load a replacement content in a new smart card and ship it to the user 24 or can send a replacement value items to the transaction service company 34 to be loaded into the smart card 28, as done previously.

A state diagram 58 is shown in Figure 2 for representing a detailed embodiment of the processes of the present invention. The entities illustrated are the same as shown in Figure 1. The processes shown in sequential steps are as follows:

1. User establishes smart card account – The user 24 can establish an account with the company 32 on-line, through mail or other means, but in each case must provide identification as well as set up an account with the company 32. In some cases, the smart card is also used for billing, and may comprise a credit card. After the
5 account is established, the company 32 sends the smart card 28 to the user 24 together with the reader 30 and appropriate software for use with the user's computer system 26.
2. Establish service account – After the user 24 establishes an account with the smart card company 32, the company 32 sets up a user 24 account with the transaction service company.
- 10 3. User purchases value items from multiple service vendors – The user 24 can log onto a vendor web site such as service vendor 36 for the purchase of value items such as concert tickets, travel tickets, coupons, etc. Through the on-line connection the user 24 can select the particular value items desired and make payment through a conventional credit card purchase or through a secured payment connection.
- 15 4. Purchase confirmation number – Upon completion of a purchase by a user 24, the service vendor 36 transfers a purchase confirmation number for the order to the user 24.
5. Vendor's transfer purchase confirmation number and value items to the service company secure transaction server over VPN – The vendor 36 transfers the
20 purchase confirmation number and the value items purchased by the user 24 to the secure transaction server of the transaction to the service company 34 via a VPM (virtual private network). In the present example, the value items comprise tickets to a concert that were purchased by the user 24 from the service vendor 36.
6. Send purchase confirmation number – To complete the payment process and
25 obtain the value items purchased, the user 24 establishes a secure communication channel with the service company 34 and sends the purchase confirmation number to the service company 34.
7. Service company secure transaction server transfers value items to the user's smart card – Through a secure transaction channel, the transaction service company 34
30 transmits the value items (concert tickets) electronically to the computer 26 of the user 24 wherein the multiple value items are entered by a reader 30 into the smart card 28.

8. User uses the stored value items to purchase goods and services from the vendor agents – The user then physically transports the smart card 28 to the vendor agent 40. The smart card 28 is inserted into the reader 44 and the user 24 enters a PIN for verification. The terminal finds the two tickets for the concert at this time and
5 verifies the digital signatures and validity of the tickets. The tickets are electronically removed from the smart card 28 and the consumer is granted entry to the concert.

9. Vendor agents report all activity per time period – At some time, but no later than a predetermined time, after the smart card is read and the tickets are unloaded, the ticket redemption transaction is transmitted from the vendor agent 40 to the transaction
10 service company 34 for account reconciliation. The maximum time allowed could be 24 hours from the time of the event.

10. User reports lost smart card to smart card vendor – Should the smart card 28 be lost or stolen from the user 24, the user can report this loss to the smart card company 32 for receiving a replacement. This is an important service for consumers
15 because the smart card itself carries the value. Should replacement not be available, consumers would be substantially deterred from using the smart card.

11. Card vendor queries transaction log – The smart card vendor makes a query to the transaction service company 34 for the transaction log of the user 24.

12. Transaction log – The transaction service company 34 reads the account for
20 user 24 and produces a transaction log that indicates the value items that have not been reported as used. This list is transmitted to the smart card company 32.

13. Smart card vendor issues new card with replenished value – The smart card vendor loads replenished value into a new smart card based on the received list of value items and mails this card to the user 24 for subsequent use. The replacement value will
25 be the value items originally purchased from the service vendor 36 less the value items that were removed by vendor agent 40. The smart card company 32 will not load the replacement smart card until the time period for reporting the consumed items has elapsed. Optionally, the smart card company 32 can request that the transaction service company 34 load the replacement smart card through the user computer 26 in the
30 method described above in step 7.

The smart cards have limited storage capability because of the required small physical size. Contemporary smart cards have a capacity of 16k bytes which will soon become 32k bytes. However, in any case this is a limited amount of storage space compared to space used by typical application programs and data storage in computer systems. The layout of application programs in a conventional smart memory card is shown in Figure 3. Each vendor utilizes a separate application for the value items associated with that vendor. For example, if the service vendor 36, shown in Figures 1 and 2, is a seller of concert tickets, it would require the development and installation of an application for loading and using those value items that it sells for the smart card. Likewise, the vendor agents that accept the value items from service vendor 36 would have corresponding proprietary software for interfacing with the application of this particular vendor.

As shown in Figure 3, the memory 70 used in a conventional smart card has 6 different application programs representing vendors of 6 different products. The applications with their corresponding value item data are programs 72, 74, 76, 78, 80 and 82. Each of the application programs A-F consumes a substantial portion of the memory, but is necessary for processing the value items associated with that application. As can be seen in Figure 3, the multiple application programs create a substantial overhead that reduces the space available to the value item data entries.

Referring now to Figure 4, there is shown the memory organization and application program configuration for the present invention. The memory 90 includes a single universal loading/using application 92. This is used in common by all vendors. Further, only one common algorithm is used in the application program that is required by each of the vendor agents to read and interact with the application program 92 in the memory 90. The value item data units are stored in the memory in association with each of the vendors by use of an identification number corresponding to the vendor. The data set 94 corresponds to a vendor identified by the number "1." Likewise, the value item data sets 96-112 corresponds to respective vendors 2, 3, 4, 5, 6, 7, 8, 9 and 10. Thus, the memory 90 configuration of the present invention utilizes a much smaller proportion of the memories for the application program, thereby leaving a much larger portion of the limited memory space available to value item data units.

A further description of the present invention is in reference to Figure 5 which shows the relationships of the application program software involved in the storing and use of value items through a smart card, as previously described. The entities shown in Figure 5 include a user 130, a reader application A1 program 132, transaction service
5 company 134 having an application A program 136, a group of smart cards 138, 142 and 146 having respective application A2 programs 140, 144 and 148. There are further included a vendor agent 156 having a reader application A 3 program 158 and a vendor agent 160 having a reader application A 3 program 162.

The application programs A, A1, A2 and A3 are integrated to provide support
10 for multiple vendors through one transaction service company 134. Each of the smart cards 138, 142 and 146 has a similar application program, which represents the program 92 shown in Figure 4, for interacting with the reader application A1 as well as the reader application A3 at each vendor agent.

Although several embodiments of the invention have been illustrated in the
15 accompanying drawings and described in the foregoing Detailed Description, it will be understood that the invention is not limited to the embodiments disclosed, but is capable of numerous rearrangements, modifications and substitutions without departing from the scope of the invention.

WHAT IS CLAIMED IS:

1. A memory structure for a smart card having an electronic memory and associated processor for storing electronic value units, comprising,
a single application program for storing and accessing a plurality of value units stored in said memory,
5 a data field comprising a plurality of groups of said value units, each group corresponding to a different vendor of said value units, and
each said group of value units having an identification character for defining the vendor associated with the group.
2. A method for storing value items in a smart card, comprising the steps of:
receiving value items at a secure server from each of a plurality of vendors which have sold the value items to a user,
establishing a secure communication channel between said server and a processor
5 which has said smart card connected thereto, and
transmitting said value items to said processor for loading into said smart card.
3. A method for use of a smart card, comprising the steps of:
establishing a secure channel from a server having value items stored therein to a processor having said smart card connected thereto, said value items provided by at least one vendor,
5 transmitting said value items to said processor for loading into said smart card,
applying said smart card at a first vendor agent, wherein said smart card is connected to a processor having a selected application program therein for reading said smart card to remove certain of said value items therefrom, and
applying said smart card at a second vendor agent, which is unrelated to said first
10 vendor agent, wherein said smart card is connected to a processor having said selected application program therein for reading said smart card to remove certain other of said value items therefrom.

4. A method for replacement of a smart card, comprising the steps of:
- loading a first smart card with a predetermined set of value items,
- storing a record of the value items loaded into said first smart card at a secure server,
- removing one or more of said value items from said first smart card,
- 5 reporting to said secure server a list of the ones of said value items removed from said first smart card,
- determining said value items not reported removed from said first smart card by reference to said record and use of said list of removed value items to produce a replacement list of value items, and
- 10 storing value items corresponding to said replacement list in a second smart card.

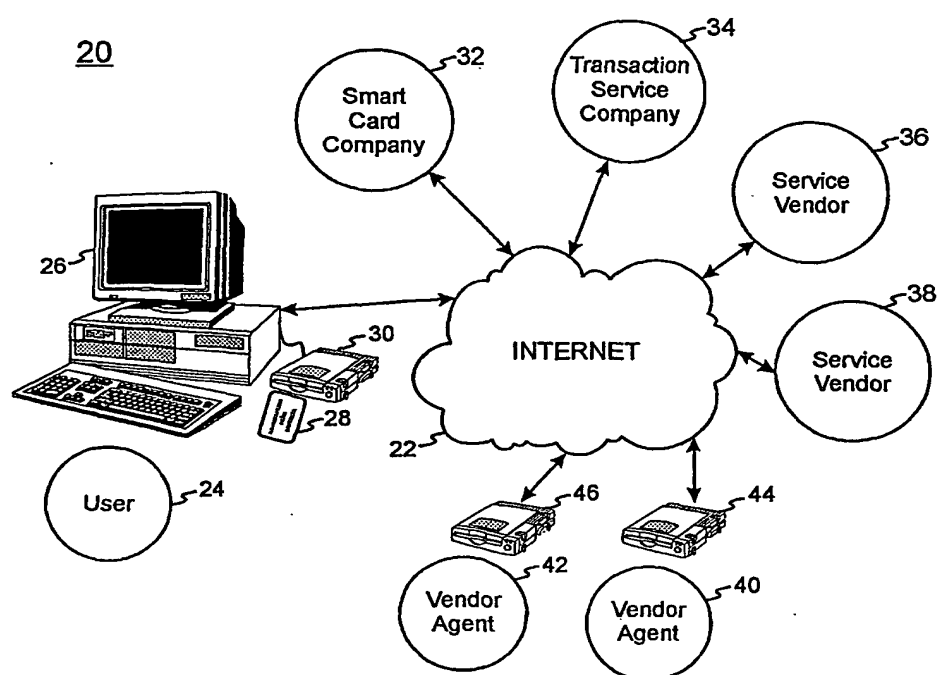


Fig. 1

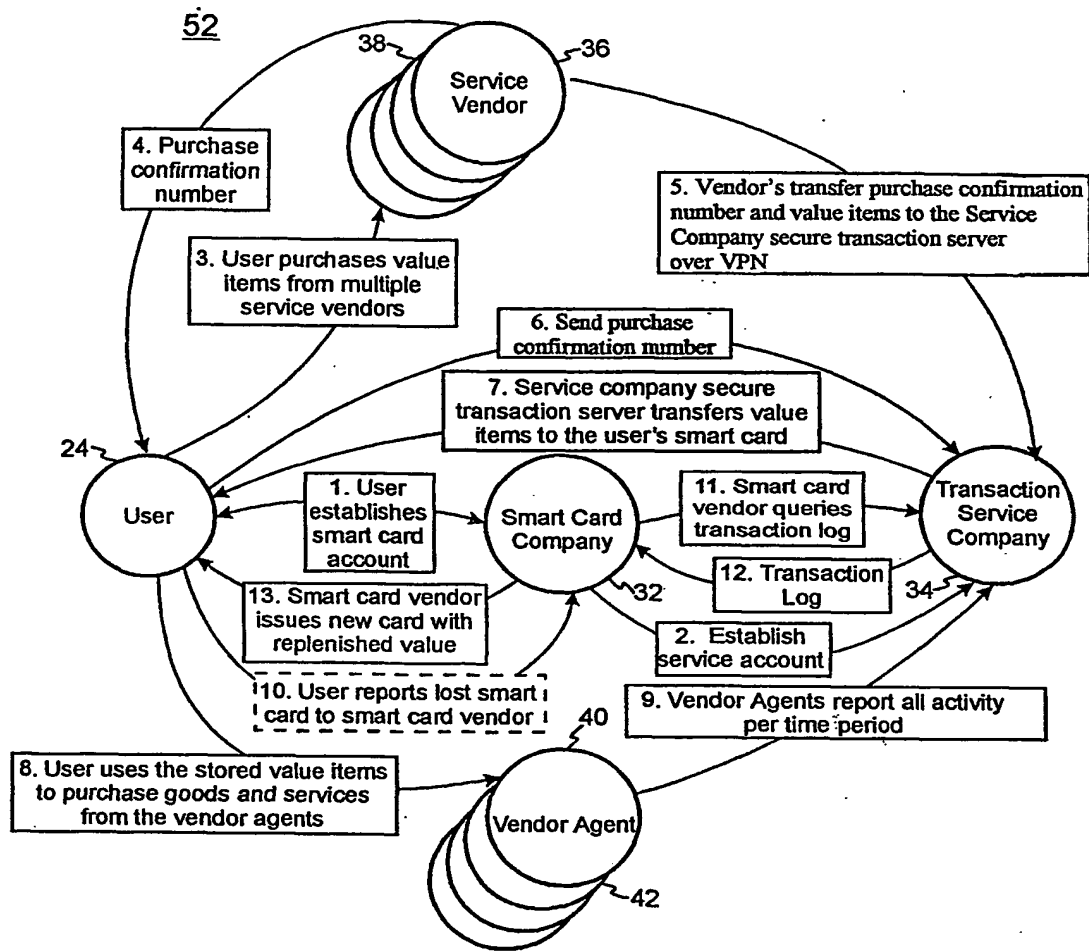


Fig. 2

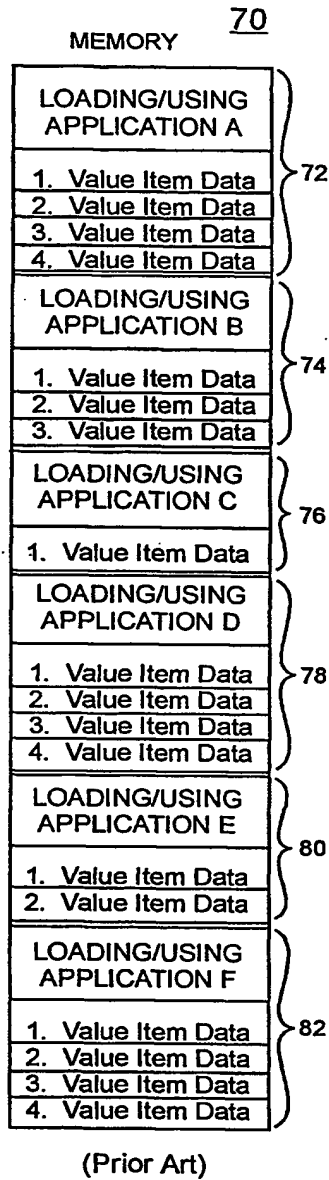


Fig. 3

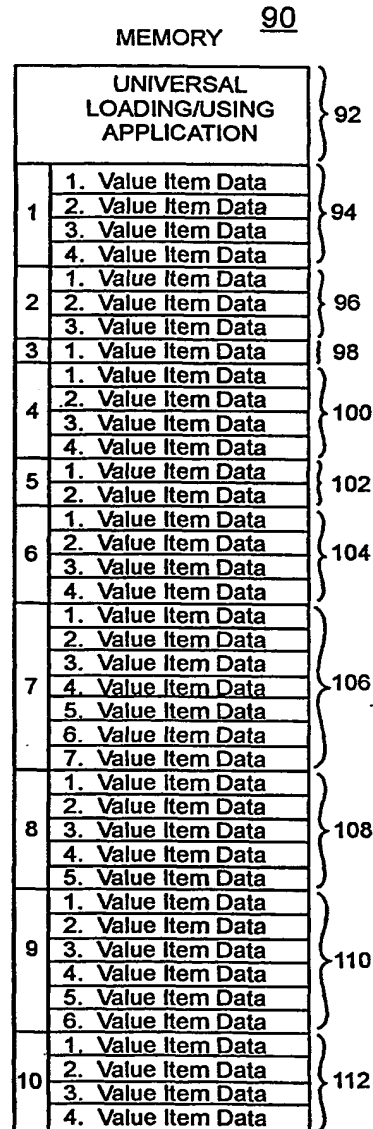
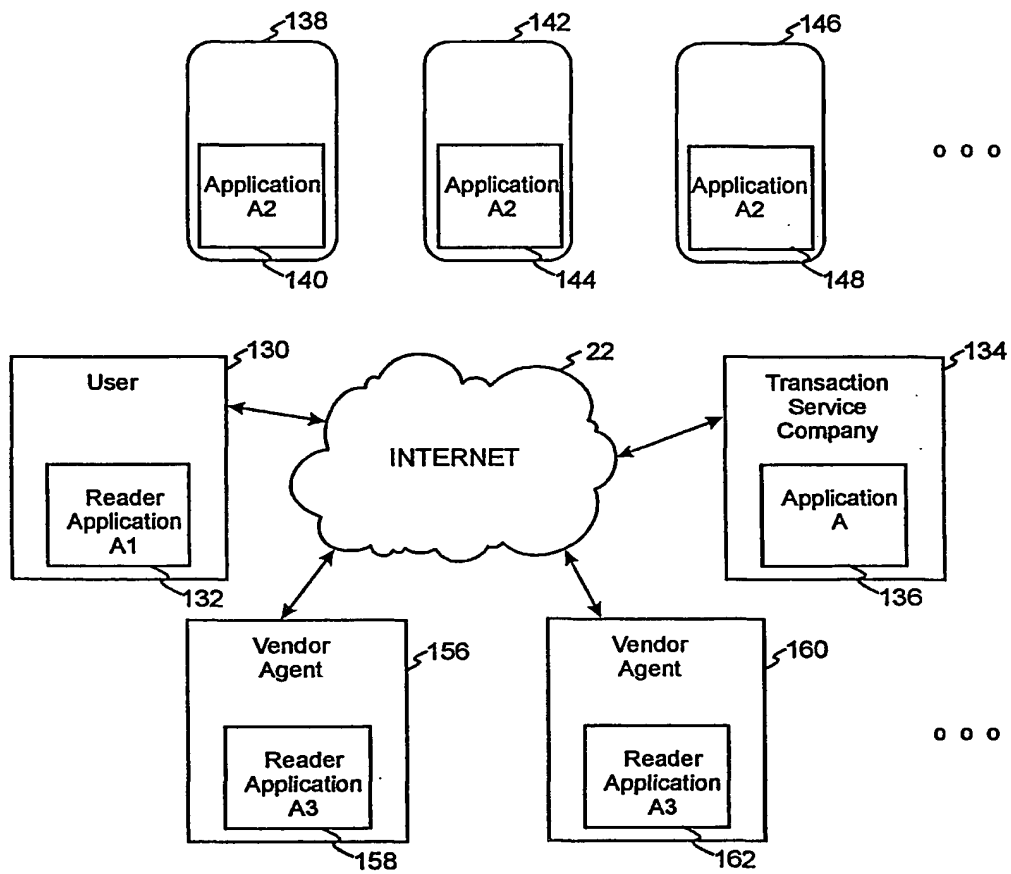


Fig. 4

**Fig. 5**

CORRECTED VERSION

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
3 January 2002 (03.01.2002)

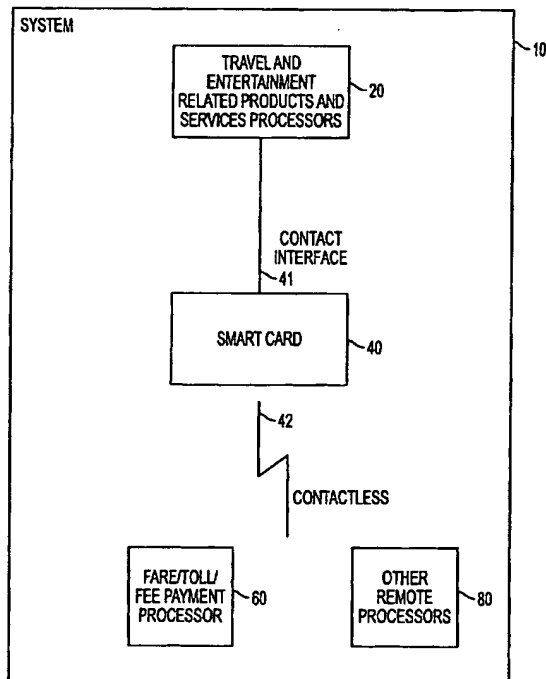
PCT

(10) International Publication Number
WO 02/001485 A1

- (51) International Patent Classification⁷: G06K 5/00 (72) Inventor: HARRELL, Martha, F.; 229-A Woodmere Drive, Williamsburg, VA 23185 (US).
- (21) International Application Number: PCT/US01/20266 (74) Agents: ALBERT, Jennifer, A. et al.; Hunton & Williams, 1900 K Street, N.W., Washington, DC 20006 (US).
- (22) International Filing Date: 26 June 2001 (26.06.2001)
- (25) Filing Language: English (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (26) Publication Language: English
- (30) Priority Data: 09/604,117 26 June 2000 (26.06.2000) US (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
- (71) Applicant: SMARTCLIC CORPORATION [US/US]; 12050 Jefferson Avenue, Suite 609, Newport News, VA 23606 (US).

[Continued on next page]

(54) Title: SMART CARD SYSTEM AND METHOD FOR PROVIDING TRAVEL AND ENTERTAINMENT-RELATED RESOURCES



(57) Abstract: A smart card system for providing travel and entertainment-related resources and associated methods is provided. The smart card system (10) includes a smart card payment processing facility for communicating with the smart card for automated payments of fares and/or tolls. The smart card comprises a contactless (42) and a contact (41) interface for collecting payments for travel and entertainment-related functions. The smart card system may be used to pay other types of travel and entertainment charges, such as airline fares, bus fares, entertainment park entrance fees and parking fees. The card may further include tools for purchasing travel- and entertainment-related products.

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patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(15) Information about Correction:

see PCT Gazette No. 36/2002 of 6 September 2002, Section II

Published:

— with international search report

(48) Date of publication of this corrected version:

6 September 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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SMART CARD SYSTEM AND METHOD FOR PROVIDING TRAVEL AND ENTERTAINMENT-RELATED RESOURCES

FIELD OF THE INVENTION

5 The present application relates to smart cards for serving travel-related and entertainment-related functions, and in particular to smart cards useful in facilitating automatic fare, fee, and toll payment.

BACKGROUND OF THE INVENTION

10 Over the past several years, smart card technology has developed to overtake magnetic stripe-only technology for many applications. Smart cards are generally made to match the size of a credit card, but have an embedded microprocessor chip that allows for receipt, processing, storage, and transmission of information. The chip generally allows smart cards to store orders of magnitude times as much data as magnetic stripe technology.

15 In addition to the increased storage capacity, information stored on smart cards can be more readily secured than with magnetic stripe technology. Smart cards are not required to carry information, such as account numbers or names, on the face of the card. Smart cards can store electronic digital signatures or other security information which is invisible to the user. Also, smart cards may be useful to protect a user from having to
20 transmit personal data such as credit card numbers. All data transmitted through smart card technology is encrypted. Through this capability, smart cards provide secure electronic commerce.

Several types of smart cards are now produced. Smart cards can be categorized according to their capabilities and their usage mode. First, with regard to capabilities,
25 smart cards may either be (a) intelligent cards, or (b) memory cards. Intelligent cards or CPU cards contain a central processing unit (CPU) that has the ability to store and secure information, and make decisions. Memory cards are primarily information storage cards that do not process information.

With regard to usage mode, smart cards can either be used as (a) contact cards, or
30 (b) contactless cards. The contact cards need to be inserted in a smart card reader, which touches a conductive module on the surface of the card in order to be read. The contactless card makes use of an electromagnetic signal and an antenna on each smart

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card for communication between the card and the card reader. Reading distances for contactless cards range from one inch to several feet in distance.

Two types of cards capable of operating in both contact and contactless modes have also been developed. Hybrid cards are dual chip cards in which each chip has a
5 respective contact and contactless interface, which are not connected to one another inside the card. Combi cards include a single chip that has both contact and contactless interfaces.

Several prior art systems have been employed to facilitate toll collection. The following are examples of the systems known in the art. U.S. Patent No. 5,424,727 to
10 Shieh discloses a method and system for two-way packet radio-based electronic toll collection. U.S. Patent No. 5,451,758 to Jesadanont discloses a system for collecting tolls through the use of magnetic cards. U.S. Patent No. 5,485,520 to Chaum et al. discloses a system for automatic real time highway toll collection from moving vehicles. U.S. Patent
15 No. 5,602,375 to Sunahara et al. discloses an automatic debiting system suitable for free lane traveling. U.S. Patent No. 5,825,007 to Jesadanont discloses a method of paying tolls with pre-paid cards.

All of these systems suffer from various deficiencies. In particular, the cards employed have limited capabilities and can generally only be used for toll collection.

20 SUMMARY OF THE INVENTION

It is accordingly an object of the invention to provide a smart card system and method for providing a smart card for serving travel-related and entertainment-related functions.

A further object of the invention is to provide a smart card that facilitates
25 automatic fare, fee and toll payment for such travel-related and entertainment-related functions.

Yet a further object of the invention is to provide a system and method for using a smart card with contact and contactless interfaces to pay fares, fees and tolls and a contact interface for obtaining information.

30 To achieve the foregoing objects, and in accordance with the purpose of the invention as embodied and broadly described herein, there is provided a smart card system for performing travel and entertainment-related functions. The system comprises a smart card automated payment means within the smart card for providing automated

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payment for at least one of fees, fares and tolls and an automated payment means within a payment facility for communicating with the smart card automated payment means to facilitate payment. The system additionally comprises storage means on the smart card and/or its host system for storing user identification information and available funds, and
5 card transaction information and processing means for updating funds information on the smart card and its host systems. The system additionally comprises means on the smart card for interfacing with a source web site, wherein access to travel and entertainment payment records is provided on the source web site.

In another aspect of the invention, a smart card is provided for communicating
10 with a payment central processing unit for facilitating automatic payment of at least one of fees, fares and tolls. The smart card comprises receiving means for receiving a wakeup signal and a payment amount from the payment central processing unit, storage means for storing user identification data and financial data, information transmission means for transmitting a user identification number and a card balance upon receipt of the wakeup
15 signal, and processing means for processing the payment amount transmitted by the payment central processing unit.

In yet another aspect of the invention a smart card toll payment system is provided comprising a central toll payment processing unit, wherein in a steady state, the central toll payment processing unit emits a signal, the signal maintaining a steady state
20 comprising a red light being illuminated and a toll gate being closed. The central toll payment processing facility comprises infrared transmission means. The smart card toll payment system also comprises a smart card positioned within a vehicle that interrupts the signal, the smart card including storage means for storing user identification and account balance data, processing means for updating account balance data, and
25 transmission and reception means for communicating with the central toll payment processing unit. Upon triggering of an interrupt, the central toll payment processing unit wakes up the smart card, receives smart card data, sends a payment amount, and when the payment amount is satisfied, activates a green light and raises the toll gate.

In yet another aspect, the invention provides a smart card system for performing
30 travel- and entertainment-related functions. The system comprises a smart card automated payment means within a smart card for providing for payment of at least one of fares, fees and tolls for the travel- and entertainment-related functions; an automated payment and an automated payment facility for communicating with the smart card

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automated payment means to facilitate automated payment. The system additionally comprises storage means on the smart card and/or its host system for storing user identification, available funds and card transaction information; and processing means on the smart card for updating financial information on the smart card and its host system(s).

5 The smart card automated payment means includes contactless means and contact means for collecting payments for airlines, buses and other travel- and entertainment-related functions.

In still another aspect, the invention provides a method for collecting payments of at least one of fare, fees and tolls with a payment system comprising a smart card and a

10 payment facility processing unit. The method comprises the steps of creating a steady state condition in which the smart card is in a low power state and the payment facility processing unit is in a wait state and wherein when a photodetector beam is emitted, a red light is activated, and a gate is down. The method further comprises triggering an

15 interrupt when a vehicle breaks the photodetector beam; and transmitting a signal from the payment facility processing unit to the smart card to wake up the smart card. The invention also comprises transmitting identification and balance information from the smart card to the payment facility processing unit and processing the transmitted information and assessing a payment amount. After assessing the payment amount, the payment amount is transmitted to the smart card and subtracted from an initial amount

20 stored within the smart card. The invention further comprises transmitting a verification signal from the smart card to the payment facility processing unit and activating a green light and raising the gate upon receiving the verification signal at the payment facility processing unit.

These and other features, objects, and advantages of the preferred embodiments

25 will become apparent when the detailed description of the preferred embodiments is read in conjunction with the drawings attached hereto.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a block diagram illustrating the system for providing travel- and

30 entertainment- related services;

Figure 2 is a block diagram illustrating an embodiment of the smart card of the invention;

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Figure 3 is a block diagram illustrating the details of an embodiment of the payment central processing facility of the invention;

Figure 4 is a block diagram illustrating components of the payment system associated with the payment central processing facility;

5 Figure 5 illustrates travel related services that can be provided to smart card users, and

Figure 6 is a flow chart illustrating a method of collecting payments according to one embodiment of the invention.

10 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings in which like reference numerals refer to corresponding elements.

Figure 1 is a block diagram illustrating an embodiment of a smart card 40 system 15 10 for travel- and entertainment-related services. The system 10 comprises a smart card 40, which preferably includes a contact interface 41 and a contactless interface 42. The details of these interfaces will be described in greater detail with reference to Fig. 2. Through the use of the contactless interface 42, the smart card 40 is preferably able to communicate with a payment processor 60 and other remote processors 80. Through the 20 use of contact interface 41, the smart card 40 communicates with other remote processors 80 that dispense travel- and entertainment-related services, information, and/or products. The smart card 40 interfaces through contact interface 41 with other travel- and entertainment-related products and services processors 20.

Figure 2 illustrates additional details of the smart card 40. The smart card 40 is of 25 the intelligent type including a microcontroller 45 for processing. In one preferred embodiment, the microcontroller is a microchip PIC processor having a reduced instruction set computer (RISC) architecture. An electrically erasable programmable read only memory (EEPROM) 44 stores user identification data and account data on the smart card 40. A transmission/reception mechanism 46 communicates with external processors 30 such as the payment processor 60. The smart card 40 is powered by power supply 43, which in a preferred embodiment comprises a lithium cell. Microcontroller 45 preferably includes a contact interface such that the smart card 40 can be read through direct insertion into a smart card 40 reader. Alternatively, the smart card 40 could be provided

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with a magnetic stripe for providing a contact interface 41. The data I/O connection 45a and reset/wakeup connection 45b function in conjunction with contactless interface 42 to receive data and bring the smart card 40 from a low power state to an operating state as will be explained in greater detail with respect to the method of the invention.

5 In a first preferred embodiment of the apparatus of Fig. 2, an infrared smart card 40 is provided. The contactless interface 42 preferably operates with a transmission/reception mechanism 46 that comprises a light emitting diode (LED) for transmission and a phototransistor for detection. Using the aforementioned components, the smart card 40 should have an effective transmission/reception range of about twenty-
10 five feet and a high power consumption of approximately 50 milliamps.

In a second preferred embodiment of the apparatus of Fig. 2, the transmission/reception mechanism comprises a micron microstamp communications engine integrated circuit that operates based on radio frequency (RF) communications. The preferred operating frequency is a 1.44 GHz Spread Spectrum Mode. Using the
15 above-identified components, the effective transmission/reception range of the smart card 40 is approximately 40-60 feet. The smart card 40 will have a low power consumption of approximately five microamps in the low power state and 2 microamps during the operating state. A disadvantage of the second preferred embodiment is its higher overall cost.

20 Figure 3 illustrates the payment processor 60 to be used in connection with contactless interface 42. This embodiment is particularly directed to the payment processor 60 but can be adapted for other types of fare, fee or toll payment or processing. The payment processor 60 preferably comprises a microcontroller 62 that interfaces with a payment facility that may comprise toll gate through connection 62c. A
25 transmission/reception mechanism 63 is provided for communicating through mechanism 63a with the smart card 40. The transmission/reception mechanism 63 transmits data between the smart card 40 and through data I/O connection 62b and operates to serve the reset and wakeup functions so as to convert from a wait or low power state to an operating state. The payment processor 60 is powered by power supply 61.

30 In the embodiment of the payment processor 60 corresponding to the first embodiment of the smart card 40, the payment processor 60 comprises an IR transmission and reception mechanism 46. In the second embodiment of the invention, the payment

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processor 60 comprises a transmission/reception mechanism that is an RF micron microstamp communications engine integrated circuit.

Figure 4 illustrates an application in which the payment processor 60 is linked to a payment facility interface 70 that may comprise a toll gate interface. The payment facility interface 70 sends signals directly to facility 71 that may comprise a toll gate that can be raised and lowered. The payment facility interface 70 further connects with accounting processor 72, which is used to manage accounting for the toll gate system.

Figure 1 also depicts the contactless interface 42 communicating with other remote processors 80. Such remote processors 80 could include parking fee processors, airline fare processors or entertainment fee and/or fares and/or tolls processors. The smart card 40 could be linked with participating processors to pay predetermined fees for all of the aforementioned items.

Figure 5 illustrates additional entertainment and travel-related products and services processors 20. Card reading units 21a and 21b may be provided such that users can access tourist traveler assistance and traveler information through an Independent service provider. The processors 20 would check for valid smart card 40 identification data (i.e., verification that the user is authorized to access the processors 20) prior to providing the requested products and/or services. As shown in connection with card reading systems 21a and 21b, the service providers can provide highway advisory radio information 31, traffic monitoring information 32, and commercial vehicle database information 33. The card readers 21a and 21b may be of the type generally known to those skilled in the art.

By interfacing with multiple types of processors 20, the smart card 40 can perform such functions as paying for bus and airline fares and parking fees and providing paperless receipts.

Phone connection 23 illustrates the use of the smart card 40 to notify a transit agency dispatcher 22 that a ride is required. Transit agency dispatcher 22 dispatches vehicle 24 to the appropriate location.

The smart card 40 can further be used to interface with an entertainment processor that allows payment of usage fees or entry fees for an amusement or theme park. Preferably, through insertion into a card reader associated with a computer and interaction with processors over the Internet, the smart card 40 allows for reading and downloading of smart card 40 account records online. The Internet connection also allows for adding

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cash, credit or debit value to the smart card 40. Furthermore, through Internet interaction, the smart card 40 can access technical support and travel information regarding roads, weather, airlines, and flights. Additional functionality can be provided by allowing smart card 40 to be used over the Internet to purchase goods and services of company clients
5 from the smart card 40 provider web site and to purchase goods and services from companies linked to the smart card 40 provider's web site. Additional functionality can include the ability to receive general smart card 40 information and the sending of electronic mail to the smart card 40 company and its linked partners. Alternatively, the smart card 40 can be inserted into a suitable wireless device having a smart card reader
10 and enabling Internet access.

The aforementioned objectives may be achieved through provision of a variety of software packages for use in connection with external processors 20, 60 and 80. A first software package includes a set of wireless communication functions allowing for two-way vehicle communication capabilities, wireless network access and messaging,
15 integration of a phone with a vehicle dashboard computer function and inter-vehicle communication. The wireless communication software package may further comprise an operating system for a vehicle dashboard computer and integration of a CD-ROM with appropriate electronic subsystems.

A second software package that may be used in conjunction with the smart card
20 40 is a map package that provides enhancements to vehicle dashboard navigation systems. The map package can provide capability to receive real time data from RF towers, roadside sensors, satellites, and other computers. The map package can further provide capability to communicate real time or stored data via audio or audiovisual means. The package may also provide a hand help map navigation system for use by
25 non-drivers.

A third software package may be provided for enhancing vehicle dashboard vehicle diagnostics. This package can help avoid vehicle break downs by enabling systems check-ups. It can further provide insurance and vehicle sales related records messaging.

30 Finally, payment processing software may be provided for facilitating automatic payment. This software is described below in accordance with the method of the invention.

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A method of collecting payments in accordance with the smart card system 10 of the invention is depicted in Figure 6. The method of collecting payments as depicted in Figure 6 employs the smart card 40 and payment system 60 shown in Figs. 2 and 3, respectively.

5 In a steady state, prior to payment, the smart card 40 is in a low power state. The payment processor 60 is in a wait state. A photodetector beam emanates across the path of oncoming vehicles and is associated with the payment processor 60. The facility 71 as depicted in Fig. 4 is a toll gate and is in a down position and a red light is illuminated.

The method of collecting payments begins when a vehicle interrupts the
10 photodetector beam. The interruption of the photodetector beam triggers an interrupt in the payment processor 60 in step 100. The interrupt causes the payment processor 60 to send a wake up pulse to smart card 40 in step 105. The payment processor 60 waits for a response from the smart card 40 and checks for the response in step 110. If no response is detected in step 110, the processor 60 will return to step 105 and continue to send wake
15 up pulses until a predetermined number of pulses has been sent in step 115. When the predetermined number of pulses has been sent and no response has been received from the smart card 40, the processor 60 displays an appropriate message and ends the payment process.

If in step 110, a response is detected, it is received in step 120 and should
20 correspond to an identification number. In step 125, the payment system 60 attempts to verify the identification number and balance. If verified in step 130, a signal containing data related to the amount of the payment is transmitted to the smart card 40 in step 140. If the identification information provided by the smart card 40 is determined to be invalid in step 130, a corresponding message is displayed in step 135, which preferably instructs
25 the vehicle to pull out of the lane. The payment process then ends when the vehicle pulls out of the lane.

If the identification information is determined to be valid in step 130, the signal including the payment amount is transmitted to the smart card 40 in step 140. If the payment amount is not received by the smart card 40 in step 145, it returns to a low
30 power state in step 150. If the payment amount is received by the smart card 40 in step 145, the payment amount is subtracted from the stored value balance on the smart card 40 in step 155 and the smart card 40 sends its new balance to the payment processor 60 in step 160. If the new balance signal is not received by the payment processor in step 165,

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payment processor 60 times out in step 170 and displays an appropriate message. If the new balance, or in the alternative a verification signal, is received by the payment processor 60 in step 165, the green light is turned on and the gate is opened in step 175. In step 180, the system 60 returns to a steady state.

5 It will be apparent to those skilled in the art that various modifications and variations can be made in the system and method of the present invention without departing from the spirit and scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided that they come within the scope of the appended claims and their equivalents.

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WHAT IS CLAIMED IS:

1. A smart card system for performing travel- and entertainment-related functions, the system comprising:
 - a smart card automated payment means within a payment facility for providing
 - 5 automated payment of at least one of fees, fares and tolls;
 - automated payment means within a payment facility for communicating with the smart card automated payment means to facilitate payment;
 - storage means on the smart card and/or its host system for storing user identification, available funds, and card transaction information;
 - 10 processing means for updating funds information on the smart card and its host system(s); and
 - means on the smart card for interfacing with a source web site, wherein access to travel and entertainment payment records is provided on the source web site.
2. The smart card system of claim 1, wherein the smart card automated
- 15 payment means and the automated payment means within the payment facility comprise contactless payment means.
3. The smart card system of claim 1, wherein the smart card automated payment means and the automated payment means within the payment facility comprise contact payment means.
- 20 4. The smart card system of claim 2, wherein the contactless payment means comprises light emitting diodes and phototransistors.
5. The smart card system of claim 2, wherein the contact means and the contactless means within the smart card are provided on a single chip.
6. The smart card system of claim 2, wherein the contact means and the
- 25 contactless means within the smart card are provided on two separate chips.
7. The smart card system of claim 1, wherein the contact means comprises a magnetic stripe.
8. The smart card system of claim 1, wherein the storage means comprises an electrically erasable programmable read only memory.
- 30 9. The smart card system of claim 1, wherein the contact means for accessing a source web site comprises means for accessing travel information including at least one of road conditions, weather conditions, and airline schedules.

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10. The smart card system of claim 1, wherein the contact means for accessing a source web site comprises means for changing the stored value on the smart card.
11. The smart card system of claim 10, wherein the means for changing the stored value comprises means for adding a cash, credit or debit value to the smart card.
- 5 12. The smart card system of claim 1, wherein the contact means for accessing a source web site comprises means for providing access to technical and customer support.
13. The smart card system of claim 1, wherein the storage means stores card transaction information.
- 10 14. The smart card system of claim 1, wherein the smart card comprises means for wireless communication with the source web site.
15. The smart card system of claim 1, wherein the smart card comprises contact means for interfacing with the source web site through the use of a card reader.
16. A smart card for communicating with a payment central processing unit
15 for facilitating automatic payment of at least one of fees, fares and tolls, the smart card comprising:
receiving means for receiving a wakeup signal and a payment amount from the payment central processing unit;
storage means for storing user identification data and financial data;
20 information transmission means for transmitting a user identification number and a card balance upon receipt of the wakeup signal; and
processing means for processing the payment amount transmitted by the payment central processing unit.
17. The smart card of claim 16, wherein the storage means comprises an
25 electrically erasable programmable read only memory.
18. The smart card of claim 16, wherein the information transmission means and the receiving means each comprise contactless means.
19. The smart card of claim 16, wherein the information transmission means and the receiving means each comprise contact means.
- 30 20. The smart card of claim 16, wherein the storage means additionally stores card transaction data.
21. A smart card toll payment system comprising:

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a central toll payment processing unit, wherein in a steady state, the central toll payment processing unit emits a signal, the signal maintaining a steady state comprising a red light being illuminated and a toll gate being closed, the central toll payment processing unit including infrared transmission means; and

5 a smart card positioned within a vehicle that interrupts the signal, the smart card including storage means for storing user identification and account balance data, processing means for updating account balance data, and transmission and reception means for communicating with the central toll payment processing unit;

10 wherein, upon triggering of an interrupt, the central payment processing unit wakes up the smart card, receives smart card data, sends a payment amount, and when the payment amount is satisfied, activates a green light and raises the toll gate.

22. The smart card system of claim 21, wherein the signal is an infrared signal, such that the vehicle interrupts a photodetector beam.

15 23. The smart card system of claim 21, wherein the signal is a radio frequency signal.

24. A smart card system for performing travel- and entertainment-related functions, the system comprising:

20 a smart card automated payment means within a smart card for providing for payment of at least one of fares, fees and tolls for the travel- and entertainment-related functions;

an automated payment facility for communicating with the smart card automated payment means to facilitate automated payment;

storage means on the smart card and/or its host system for storing user identification, available funds and card transaction information; and

25 processing means on the smart card for updating financial information on the smart card and its host system(s),

wherein the smart card automated payment means includes contactless means and contact means for collecting payments for airlines, buses and other travel- and entertainment-related functions.

30 25. A method for collecting payments of at least one of fares, fees and tolls with a payment system comprising a smart card and a payment facility processing unit, the method comprising the steps of:

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creating a steady state condition in which the smart card is in a low power state, the payment facility processing unit is in a wait state and wherein when a photodetector beam is emitted, a red light is activated and a gate is down;

triggering an interrupt when a vehicle breaks the emitted photodetector beam;

5 transmitting a signal from the payment facility processing unit to the smart card to wake up the smart card;

transmitting identification and balance information from the smart card to the payment facility processing unit;

processing the transmitted information and assessing a payment amount;

10 transmitting the payment amount to the smart card;

subtracting the payment amount from an initial amount stored within the smart card;

transmitting a verification signal from the smart card to the payment facility processing unit; and

15 activating a green light and raising the gate upon receiving the verification signal at the payment facility processing unit.

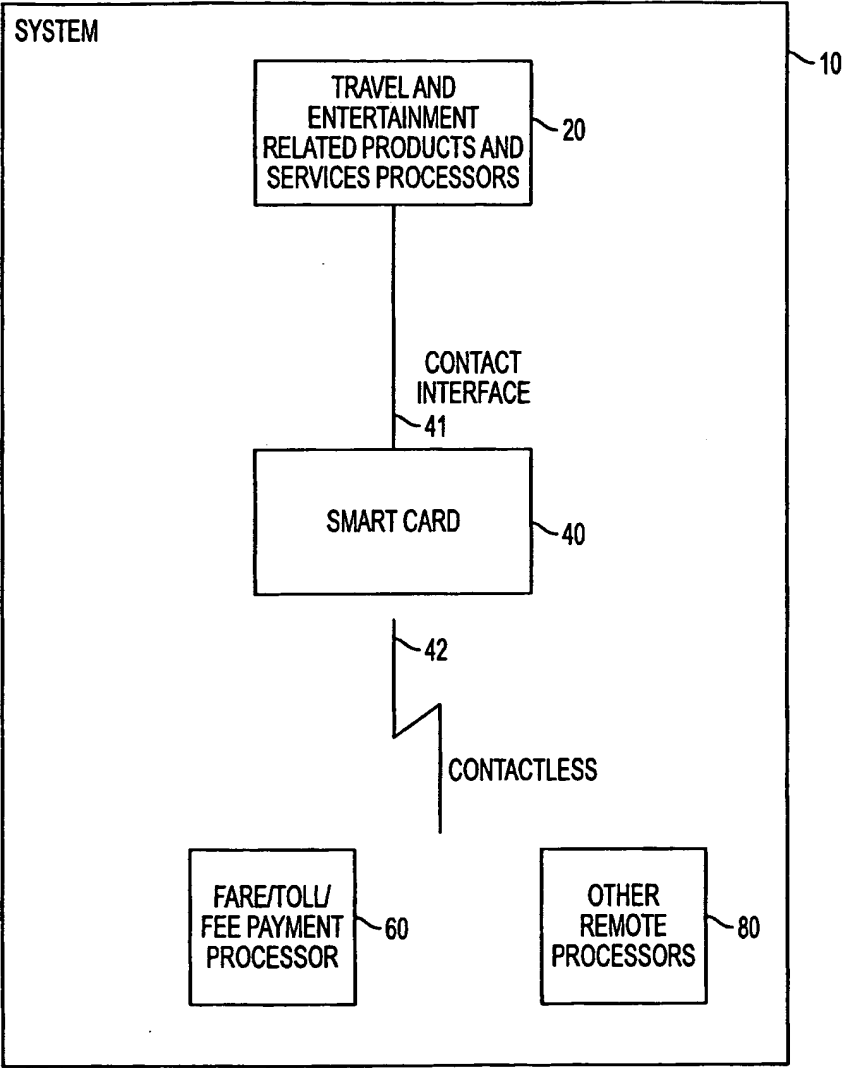


FIG. 1

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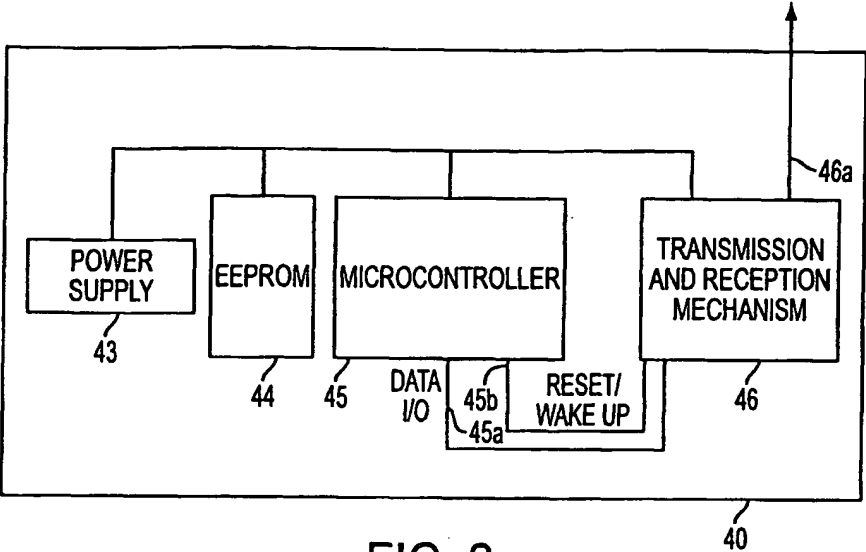


FIG. 2

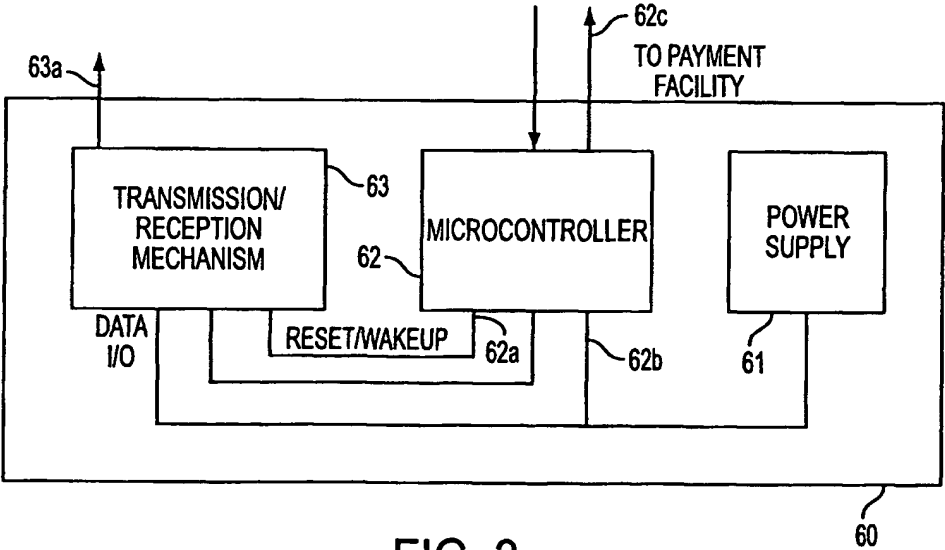


FIG. 3

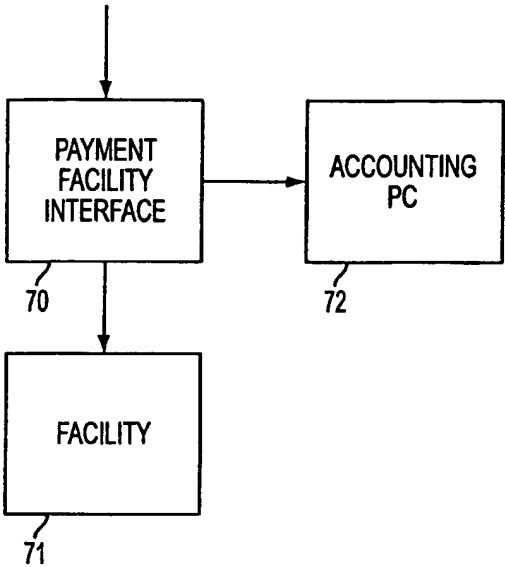


FIG. 4

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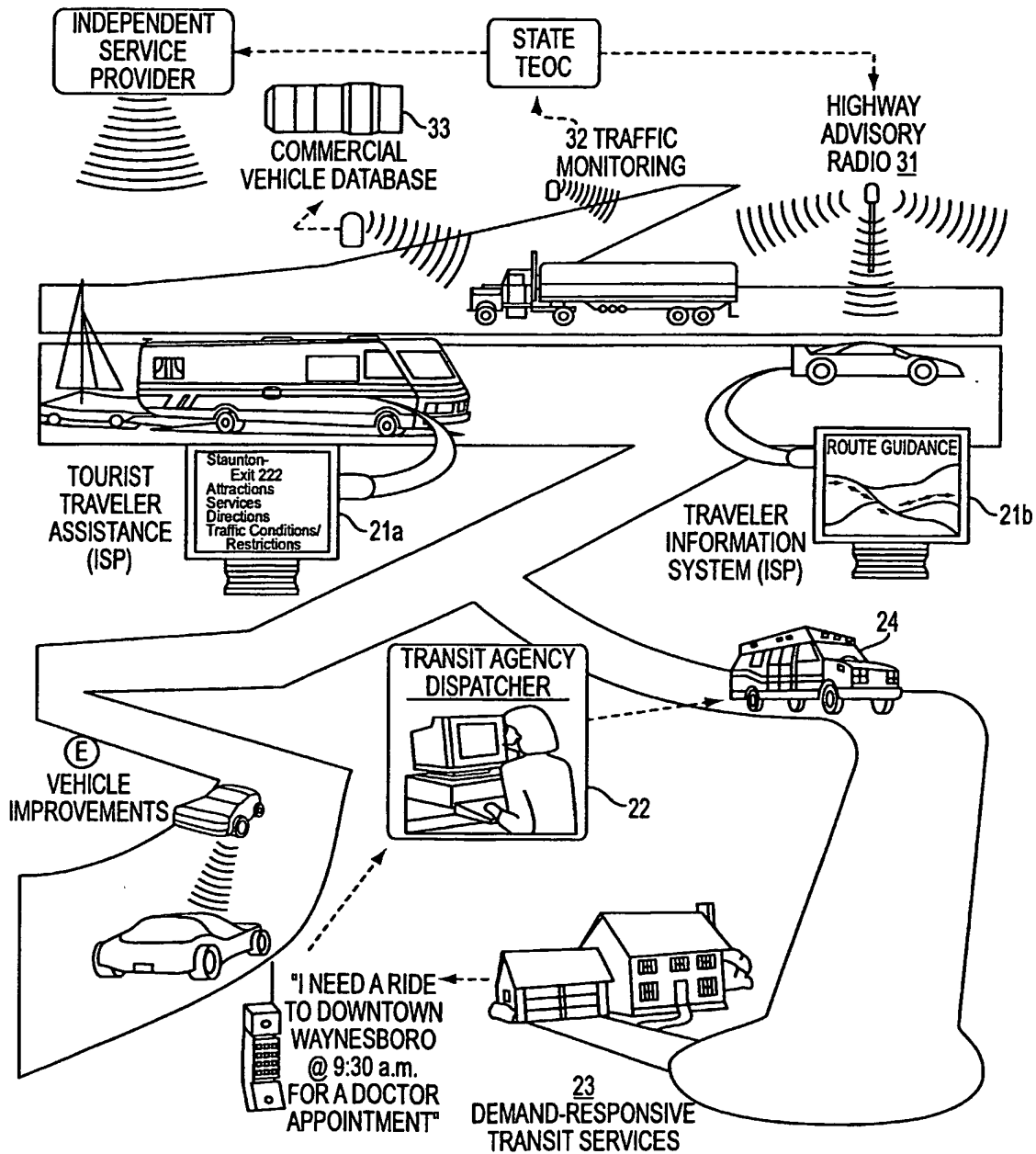


FIG. 5

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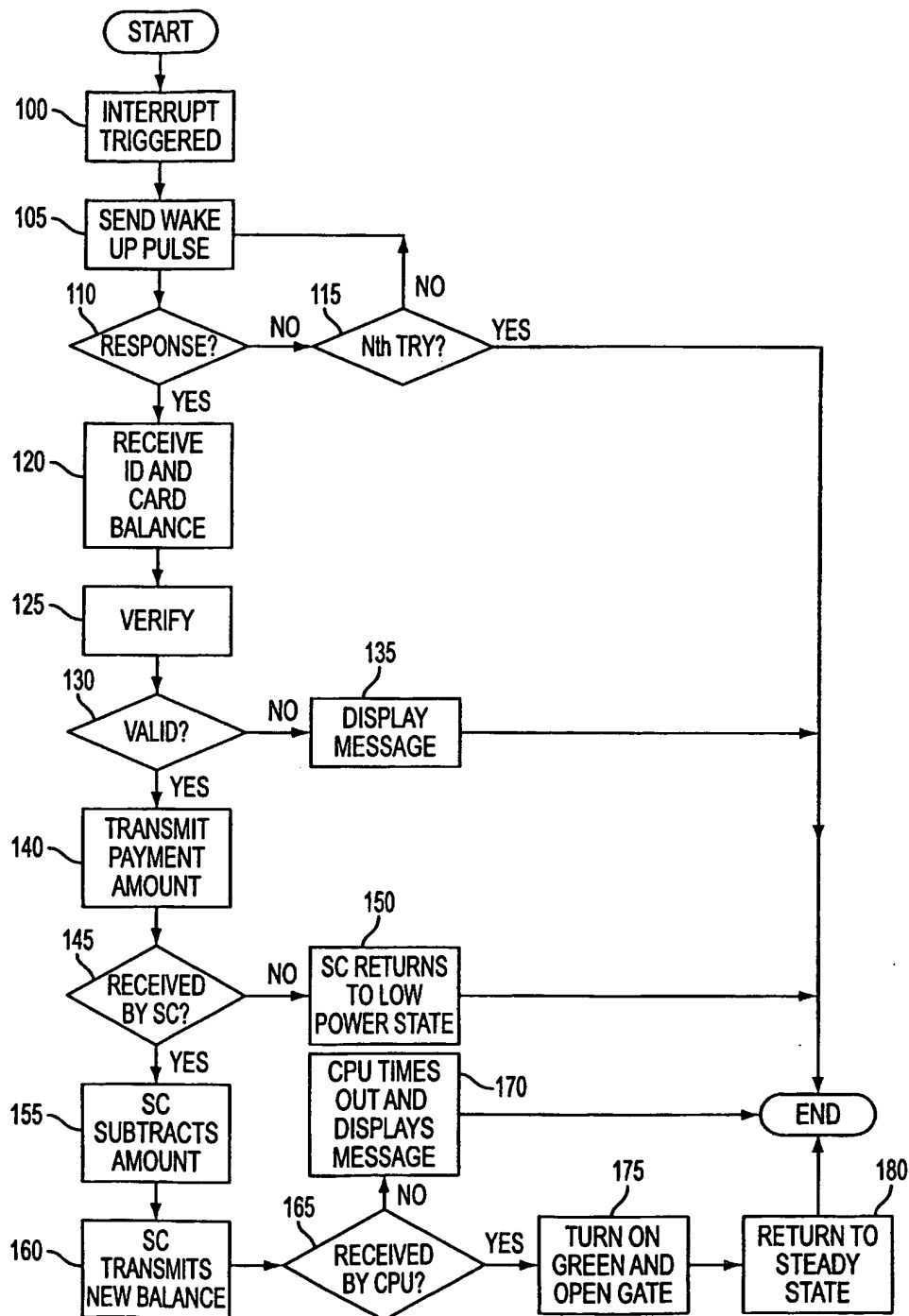


FIG. 6

SUBSTITUTE SHEET (RULE 26)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/20288

A. CLASSIFICATION OF SUBJECT MATTER		
IPC(7) : G06K 5/00 US CL : 235/380, 381, 492		
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) U.S. : 235/380, 381, 492		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched NONE		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) NONE		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,594,233 A (KENNETH et al) 14 January 1997 (14.01.1997), see entire document.	1-25
Y,P	US 6,246,985 B1 (KANEVSKY et al) 12 June 2001 (12.06.2001), see entire document.	1-25
Y	US 5,819,234 A (SLAVIN et al) 06 October 1998 (06.10.1998), see entire document.	1-25
Y	US 4,963,723 A (MASADA) 16 October 1990 (16.10.1990), see entire document.	1-25
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
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Date of the actual completion of the international search 15 AUGUST 2001		Date of mailing of the international search report 31 AUG 2001
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Form PCT/ISA/210 (second sheet) (July 1998)*

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
17 October 2002 (17.10.2002)

PCT

(10) International Publication Number
WO 02/082386 A1

(51) International Patent Classification⁷: G07F 7/08, 7/10

(21) International Application Number: PCT/GB02/01634

(22) International Filing Date: 8 April 2002 (08.04.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0108723.8 6 April 2001 (06.04.2001) GB

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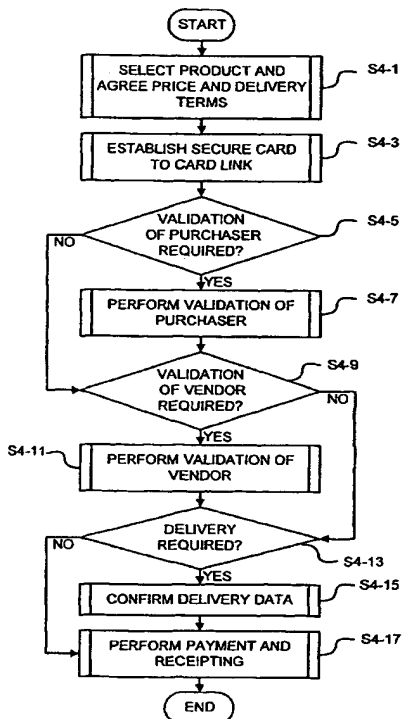
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WC1R 5DH (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,

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(54) Title: PAYMENT SYSTEM



(57) Abstract: An electronic transaction payment system is provided having a vendor terminal associated with a vendor who provides goods or services to a purchaser, a vendor smart-card and a vendor smart-card reader for transmitting data to and receiving data from the vendor smart-card. The system also includes a purchaser smart-card reader which is connected to the vendor terminal and which is operable for transmitting data to and receiving data from a purchaser smart-card. In operation, payment for goods purchased by the purchaser is made between the purchaser smart-card and the vendor smart-card. In a preferred embodiment, the payment data is encrypted using an encryption key specific to the transaction between the purchaser and the vendor. A third party registry terminal may also be provided for providing validation of the vendor and/or the purchaser.

WO 02/082386 A1



LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report
 ----- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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PAYMENT SYSTEM

5 This invention relates to a payment system and in particular but not exclusively to a smart-card payment system wherein an entire purchase operation is explicitly linked as a single transaction and a variable level of user validation is provided.

10 Existing payment systems suffer from a number of drawbacks. The use of cash for example is limited by the requirement for the actual transfer of possession of physical tokens and by the fact that if lost or stolen, cash is usable without restriction by a finder or thief.

15 The use of cheques goes some way to overcome the security worries of carrying cash but still requires the transfer of a physical token. Cheques also introduce the problem of "clearing time", that is, time taken by banks to actually transfer money from the cheque writer's account to the cheque receiver's account. In addition, there is a possibility with a cheque that a bank may refuse to honour a cheque written by an account holder because the account holder has insufficient funds in their account. In this circumstance, the receiver of the cheque has then transferred ownership of goods or provided a service and has received no payment for those goods or that service.

25 For ordering goods by telephone or using the internet, cash is totally unsuitable and cheques are very inconvenient because to pay by cheque for goods ordered

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by telephone or over the internet requires the order placed using the telephone or the internet to be confirmed in writing accompanied by a cheque for payment.

5 More suitable for use with internet or telephone orders are credit and debit cards. When using a credit card, payment for the goods is actually made to the retailer by a credit card company which allows the credit card user to spend up to a predetermined borrowing limit for
10 purchases. Purchases made with a credit card must be paid for to the credit card company within a predetermined time limit or interest on the money borrowed becomes payable. Debit cards on the other hand provide for an electronic transfer of funds direct from
15 the card holder's bank account to the retailer's bank account. Credit and debit cards also suffer from the problems of "clearing time".

Both credit and debit cards use conventional magnetic
20 stripe card technology. Both payment systems also suffer from processing charges inherent in the system. These processing charges are typically levied on the vendor and may be in the range of one to four per cent of the sale transaction. Sometimes all or part of this cost is
25 passed onto the purchaser. This transaction cost has a minimum size which is set by the banks and credit card companies operating the cards. As a result, it is economically disadvantageous to process small value transactions using credit and debit cards.

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Credit and debit cards do however have the advantage for telephone and internet transactions that there is no requirement for the transfer of physical tokens. They can therefore be used to make purchases or to reserve restaurant tables for example, without the need for postal or personal transfer of payment. The use of a credit card to make a purchase provides the purchaser with extra protection in that the credit card company must cover the cost of goods paid for on the card, over a certain minimum value, which are not delivered or with which there are certain other problems. In addition, the credit card operator pays the vendor regardless of whether or not the purchaser ever repays that money to the credit card company. Thus both vendor and purchaser benefit from the use of a credit card. However, for telephone and internet transactions, which are defined by the credit card operator as "card holder not present" transactions, the risk of loss rests with the retailer not the card operator. Thus, it becomes less beneficial for a vendor to accept credit cards as payment for telephone and internet orders because they must pay the handling fee and they receive no protection.

The so-called electronic purse (e.g. the Mondex Electronic Purse System) has been developed to eliminate the problems of carrying actual cash and of the minimum processing charges for small debit or credit card transactions. The electronic purse makes use of smart-card or chip-card technology. To use the electronic purse, the user must either load cash onto the

smart-card electronic purse at a vending machine or at the desk of a load agent such as a Post Office, or the user must transfer funds from their bank account or credit card to the smart-card electronic purse. The
5 purse may then be used to make purchases in the real world, over the internet or over the telephone, subject to the telephone being with an appropriate smart-card reader.

10 From a transaction processing point of view, full clearing would only be required when loading the purse, which would normally be a medium to large value transaction and therefore acceptable. Payments could be
15 batched into daily totals and cleared to the retailers as single daily transactions, again being of reasonable size. There would be no requirement to account for every transaction back to the card holder, all that would happen would be that payment would be made out of the cash float created when taking cash to load the
20 electronic purse.

Thus from a bank's point of view, the electronic purse solved a major problem. However, from the card holder's point of view the electronic purse is less successful and
25 all open electronic purse trials have tended towards failure in terms of take up. Among the reasons for the poor take up are: poor education of the card holders, small scale trials leading to purse being usable at only a few locations, lock-in of card holder money to the card
30 and places it could be used, no interest on prepayment,

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requirement for a bank account to back the electronic purse and fear over security and transaction accountability.

5 The requirement for a bank account to back the electronic
 purse is a major failing of the system. This is because
 many people who could best benefit from an electronic
 purse (or other prepaid mechanisms) are those people who
 do not have bank accounts and who are therefore
10 automatically excluded from using cheques, debit cards
 or credit cards. Approximately twenty per cent of the
 UK population are disallowed by the banks from having a
 bank account. It should be noted that the Mondex
 Electronic Purse System was specifically developed to
15 allow use by persons not having a bank account, however
 the operators still insisted on a user having a bank
 account before a card would be issued.

 Regarding fear over security and transaction
20 accountability, the problem is one of how much the card
 holder trusts the retailer. For example, how does the
 card holder know how much credit is stored on his or her
 card and how do they know how much is removed? For
 internet transactions, this problem grows to incorporate
25 issues such as: how to identify how much is being
 deducted from the card, how to identify the other party
 to the transaction, how to identify the location of the
 other party to the transaction, whether goods will
 actually be shipped, whether the payment made will
30 actually go to the vendor, whether the vendor will

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recognise the payment as being against the goods purchased, whether the payment could be fraudulently redirected and concerns over who will be able to see the delivery address specified.

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The existing electronic purse schemes use so-called smart-cards or chip-cards. These are cards having a microprocessor and memory mounted onto or into a card, with an interface provided for the microprocessor to be powered and interfaced with by a reader. The standards for smart-cards where the interface is by means of physical connection terminals are set out in ISO 7816. The standards for smart-cards where the interface is by means of radio signals (including supply of power) are set out in ISO 14443.

15

In an attempt to address some of the above problems, a number of banks and financial card operators including Mastercard and Visa have agreed a smart-card standard for credit and debit services such that a retailer could have a common terminal to support all smart credit and debit cards in a similar manner to the current situation with magnetic stripe cards. This standard is known as EMV (Europay Mastercard Visa) and it applies to credit and debit services on smart-cards as well as the terminals to support them. An electronic purse system based on the EMV specifications is the common electronic purse specifications (CEPS) with which the European Standard Organisation (CEN) has been involved. CEPS requires a personalised system and additional hardware to identify

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the cardholder in order for him or her to digitally sign and certify all CEPS transactions. Further, for use in telephone or internet transactions, there is a requirement in CEPS for digital signatures. There is
5 currently no worldwide or European standard for producing digital signatures. Such digital signatures require a public key infrastructure administered by a certification authority which acts as a library or directory of public keys. In addition, when it supplies a public key it adds
10 a certificate signed with its own private key such that the recipient can then validate that the public key information is genuine. Within Europe, the various public key infrastructures that currently exist are not compatible and therefore such digital signatures are not
15 interoperable across services and countries. Thus the full implementation of CEPS will be delayed until such standardisation can be completed.

In summary therefore, cash and cheques require the
20 exchange of physical tokens and are therefore totally unsuitable for real time trading by telephone or over the internet. Credit and debit cards and cheques suffer from clearing time delays. Credit and debit cards are also unsuitable for small value transactions due to the
25 processing charges included. Electronic purses have been unpopular due to the "tied-in" nature of the funds and the small number of places where trials have allowed use of the purses. Credit and debit cards and electronic
30 purses have the additional problem for internet and telephone transactions of requiring trust between

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purchaser and vendor. CEPs has the drawback of an awkward and non-standard security system.

Aspects of the present invention relate to a smart-card payment system wherein:

provision is made for payment by means of prepaid value stored on a card held by the purchaser (the so-called electronic purse);

provision is made for payment by means of credit by a third party on behalf of the purchaser and accessed by means of a smart-card held by the purchaser (the so-called credit card facility);

provision is made for payment by means of prepaid value stored on behalf of the purchaser and accessed by means of a smart-card held by the purchaser (the so-called debit card facility);

provision is made for different levels of validation between the purchaser and the vendor including third party validation if required;

the provision of a third party registry to permit the movement of value or funds between the registry and the smart-card;

payment may be anonymous or personalised;

the purchaser may use either of the electronic purse and debit card facilities without having to pass any means test, credit check or hold a bank account; and

a system in which an entire purchase operation is inextricably linked as a single transaction and variable levels of user (purchaser and/or vendor) validation is provided.

The present invention seeks to address difficulties of the prior art. According to one aspect, there is provided an electronic transaction payment system comprising a vendor terminal associated with a vendor who provides goods or services to a purchaser; a vendor smart-card; a vendor smart-card reader for transmitting data to and receiving data from the vendor smart-card; a purchaser smart-card reader for transmitting data to and receiving data from a purchaser smart-card. The vendor terminal comprises means for processing requests for vendor goods or services from the purchaser, means for generating cost data identifying the cost of requested goods or services and means for transmitting the cost data to the purchaser smart-card. The purchaser smart-card includes means for receiving the cost data from the vendor terminal and means for encrypting the payment data for transmission back to the vendor smart-card. The vendor smart-card also includes means for receiving the encrypted payment data and means for decrypting the payment data to obtain payment for the requested goods or services.

Preferably, all communications relating to the purchase of the goods pass from the purchaser's smart-card to the vendor and are encrypted with an encryption key specific to the current transaction. In this way, payment of the goods and/or services can be inextricably linked to the transaction itself. The invention can be applied for electronic trading on, for example, the Internet and can be used at traditional points of sale.

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In a preferred embodiment, a third party registry is provided to provide guarantees for the purchaser and/or the vendor if required. The third party registry may provide additional support as requested and to a level
5 requested by the vendor or purchaser, to ensure trust and confidence in the trade. Either party in the transaction may choose to validate the credentials of the other party by making a reference to the third party registry. In this case, the registry will provide the information and
10 may levy an appropriate fee.

Preferred embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:

15 Figure 1 shows an internet enabled computing environment in which the present invention may operate;

Figure 2 is a block diagram showing the main functional elements of a vendor terminal and a purchaser terminal shown in Figure 1;

20 Figure 3 is a block diagram showing the main functional elements of a registry terminal shown in Figure 1;

Figure 4 is a block diagram showing the main functional elements of a smart-card shown in Figure 1;

25 Figure 5 is a flow chart showing the main processing steps performed by the terminals in Figure 1 to process a transaction;

Figure 6 is a flow diagram showing in more detail the processing steps involved in a product selection and

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price agreement step which forms part of the processing steps shown in Figure 5;

5 Figure 7 which comprises Figures 7A and 7B is a flow diagram showing in more detail the processing steps involved in a secure link set-up step which forms part of the processing steps shown in Figure 5;

10 Figure 8 is a flow diagram showing in more detail the processing steps involved in a purchaser validation step which forms part of the processing steps shown in Figure 5;

Figure 9 is a flow diagram showing in more detail the processing steps involved in a vendor validation step which forms part of the processing steps shown in Figure 5;

15 Figure 10 is a flow diagram showing in more detail the processing steps involved in a delivery confirmation step which forms part of the processing steps shown in Figure 5;

20 Figure 11 which comprises Figures 11A and 11B is a flow diagram showing in more detail the processing steps involved in a payment and receipting step which forms part of the processing steps shown in Figure 5;

25 Figure 12 which comprises Figures 12A and 12B is a flow diagram showing in more detail the processing steps involved in a purchaser validation step which forms part of the processing steps shown in Figure 5 according to an alternative embodiment;

Figure 13 is a flow diagram showing in more detail the processing steps involved in a purchaser validation

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step which forms part of the processing steps shown in Figure 5 according to a further alternative embodiment;

Figure 14 which comprises Figures 14A and 14B is a flow diagram showing in more detail the processing steps involved in a vendor validation step which forms part of the processing steps shown in Figure 5 according to another alternative embodiment;

Figure 15 is a flow diagram showing in more detail the processing steps involved in a payment and receipting step which forms part of the processing steps shown in Figure 5 according to another alternative embodiment;

Figure 16 is a flow diagram showing in more detail the processing steps involved in a payment and receipting step which forms part of the processing steps shown in Figure 5 according to another alternative embodiment;

Figure 17 is a flow diagram showing in more detail the processing steps involved in a payment and receipting step which forms part of the processing steps shown in Figure 5 according to a further alternative embodiment;

Figure 18 which comprises Figures 18A and 18B is a flow diagram showing the main processing steps required to convert currency on an account card;

Figure 19 shows an internet enabled face-to-face retail environment in which the present invention may operate;

Figure 20 is a block diagram showing the main functional elements of a retailer terminal shown in Figure 19.

Overview

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In the following description it is assumed that the purchaser's terminal is already connected to the internet, as is the vendor's terminal. Also, using his or her terminal, the purchaser has browsed the vendor's website and has selected a product or products that he or she wishes to purchase.

Referring to Figure 1, the internet enabled computing environment 1 in which the payment system of the present embodiment is operated, comprises a purchaser terminal 5, a vendor terminal 21 and a registry terminal 25 which communicate electronically with one another via a network such as the internet 19. Attached to the purchaser terminal 5 is a smart-card slot 7_p into which a purchaser smart-card 3 may be inserted. In this embodiment, the purchaser smart-card 3 must be inserted into the smart-card slot 7_p in order for any transaction to be made with a vendor. Also attached to purchaser terminal 5 is a monitor 9 for displaying data to a user, a keyboard 11 and a mouse 13 which provide a user interface to the purchaser terminal 5 and a modem 15 for communicating via the internet 19. An electrical, electromagnetic or optical signal 17 is transmitted from and received by modem 15 in order to facilitate communication via the internet 19.

As shown in Figure 1, the vendor terminal 21 also includes a monitor 9, a keyboard 11, a mouse 13, a modem 15 and a smart-card slot 7_v for receiving a vendor smart-card 23.

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Attached to the registry terminal 25 is a registry smart-card server 27 having a plurality of registry account smart-cards permanently inserted in card slots 7, therein. In this embodiment, there is typically one
5 registry account logical smart-card for each user of the payment system, although in practice many such logical smart-cards will be grouped onto one master smart-card which will substantially reduce the smart-card and smart-card reader requirement at the registry. Each registry
10 account is represented by a logical record on a master account card. The number of master account cards will be equal to the number of accounts divided by the number of logical account records on each card. Since the information on the card need only contain an account
15 number and balance, with further information held in a connected hard disk at the registry 25, there could be as many as five thousand logical account records per master card.

20 In this embodiment, every registry account is represented by a disk based record at the registry 25. As and when a registry account is to be accessed for whatever reason, key information is copied to a spare logical account slot in a master card, so that card to card working may take
25 place. The number of master cards required will be just greater than the number of parallel transactions required to provide adequate performance. After a transaction is completed, the disk record is updated. The card record is retained until the logical account slot is required.
30 This provides a form of caching to provide better

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performance for those actively using their smart-cards and registry. Typically, a retailer's account will be more active than a purchaser's account.

5 Figure 2 shows the functional elements of the purchaser terminal 5 and the vendor terminal 21. As shown, these terminals include a central processing unit (CPU) 41 which carries out processing operations in accordance with instructions stored in a working memory 43 and in
10 accordance with user input received either via the keyboard and mouse interface 49 or the smart-card reader 53. The terminals also include a monitor interface 51 for interfacing to the display, a modem interface for interfacing with the modem 15 and a non-volatile software
15 store 47 (such as a hard disk) which stores the processing instructions used to control the operation of the CPU 41 together with other data used by the terminals. As shown, these components are connected together via a bus 45.

20 Figure 3 shows the functional elements of the registry terminal 25. As shown, the registry terminal 25 also includes a CPU 41, a working memory 43, a software store 47, a monitor interface 51 and a modem interface 55
25 which are all connected together by a bus 45. In addition, the smart-card server 27 is connected to the registry terminal 25 via a smart-card server interface 57.

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Figure 4 shows the functional elements of a smart-card 3,23 used in this embodiment. As shown, the smart-card 3,23 includes a card controller 62 which carries out processing operations stored in a processing instructions store 64 in accordance with instructions received from the purchaser terminal 5, vendor terminal 21 or the registry terminal 25 via a card reader interface 66. Coupled to the card controller 62 is a money store 68, which holds data representing the amounts of money held on the smart-card 3,23. The smart-card 3,23 also includes a user validation store 70 which stores information about the smart-card owner such as the owner's name, age, address etc. When a smart-card 3,23 is used to make a transaction, a single unique session ID is generated by a session ID generator 72 on the smart-card 3,23. The generated session ID is encrypted by an encryption engine 74 also on the smart-card 3,23 and then stored in a session ID store 76. As will be described in further detail later, this session ID is appended to all subsequent messages related to the current transaction by the card controller 62, and the card controller 62 is also operable to compare the session ID of received messages to the stored session ID to check that the message belongs to the current transaction.

As shown in Figur4, the smart-card 3,23 further comprises a key store 78 for storing data needed for encryption and decryption, such as public and private keys, which will be described in more detail later. The key store 78 is

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coupled to the encryption engine 74, so that messages relating to a transaction can be encrypted by the encryption engine 74 using the stored encryption key data, before transmission back to the terminal via the card reader interface. Also coupled to the card controller 62 is a transaction log store 80 for storing data representing each transaction made using the smart-card 3,23 and a registry data store 82 for storing details of the user account held at the registry.

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Referring now to Figure 5, there are shown the principal functional steps which must be performed to complete a purchase transaction using the payment system of the present embodiment. As shown, at step S4-1, the user, having selected a desired product already, provides input indicating a product selection to the purchaser terminal 5. The purchaser terminal 5 then communicates with the vendor terminal 21 by transmitting signals 17 between the modems 55 attached to each of the purchaser terminal 5 and the vendor terminal 21 via the internet 19. The purchaser terminal 5 transmits the product selection to the vendor terminal 21, which then returns price and delivery terms to the purchaser 5. The terms are then displayed by the purchaser terminal 5 on monitor 9 and the purchaser terminal 5 then awaits an input from the purchaser to indicate approval or disapproval of those terms via the keyboard 11 or mouse 13. The inputted approval or disapproval is then communicated by the purchaser terminal 5 to the vendor terminal 21 via the internet.

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Next, at step S4-3, the purchaser smart-card 3 inserted in the purchaser terminal 5 and vendor smart-card 23 inserted in the vendor terminal 21 create and exchange secure encryption keys (which are stored in the respective key stores 78 of the purchaser and vendor smart-cards 3,23) to be used throughout the payment session and to be used as the basis for the secure exchange of information using data encryption between terminals. Before payment is made, however, in this embodiment the smart-cards 3,23 return control to the terminals so that user validation can be performed. This is initiated at step S4-5, where the vendor terminal 21 displays on monitor 9 a request for user input to indicate whether validation of the purchaser should be undertaken. Such input is received via the keyboard 11 or mouse 13. If validation is to be undertaken, processing proceeds to step S4-7 where validation is performed. To perform validation, as will be described in more detail below, the vendor terminal 21 communicates with purchaser terminal 5 or the registry 25 via the internet 19 to request identifier data about the purchaser so that certain pre-specified levels of knowledge about the purchaser are obtained.

Following purchaser validation, or if purchaser validation is not to be undertaken, the processing proceeds to step S4-9, where the purchaser's terminal 5 displays on monitor 9 a request for user input to indicate whether validation of the vendor should be undertaken. If vendor validation is required, then at

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step S4-11, validation of the vendor is performed, which is a similar process to that described above for purchaser validation. Following such validation, or if validation of the vendor is not required, processing continues at step S4-13. At this step, it is decided whether or not delivery of the product will be required. To determine whether delivery is required, the vendor terminal 21 analyses the delivery terms agreed at step S4-1. From these terms it will be clear whether anything is to be delivered. It is to be understood that delivery may include electronic transfer of data as well as postal delivery of physical items. If delivery is required, then the delivery data is confirmed at step S4-15 where the purchaser terminal transmits the relevant delivery address (which may be a postal address, an e-mail address or an FTP (file transfer protocol) server address for example) to the vendor terminal 21. Following this, or in the event that delivery is not required, control is passed back to the smart-cards 3,23 where payment and receipting is performed at step S4-17. In this step, the purchaser terminal 5 causes the appropriate value to transfer from the money store 68 of the purchaser smart-card 3 to the money store 68 of the vendor smart-card 23, during which a receipt message is transferred from the vendor smart-card 23 to the purchaser smart-card 3.

An overview of the smart-card payment system of this embodiment has been given above. The system offers a number of advantages, including:

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- i) the provision of a single session ID which links all messages in a transaction including the terms, user validation and payment, thereby inextricably linking the payment to the transaction;
- ii) the provision of different levels of user (purchaser and/or vendor) validation; and
- iii) the provision of a third party registry for validation of one or more of the parties to a transaction if required.

These and other advantages of the payment system of the present embodiment will become apparent from the following more detailed description.

Product Selection

Figure 6 shows an expansion of step S4-1 in which the purchaser terminal 5 transfers data describing a product selection to the vendor terminal 23 and the purchaser and vendor terminals 5, 23 communicate to establish the price and delivery terms for the transaction. In Figure 6, the steps undertaken by the purchaser's terminal are shown to the left hand side of the central dotted line and those steps undertaken by the vendor's terminal are shown on the right hand side of the central dotted line.

At step S5-1, the purchaser terminal 5 receives product selection input from the user via the keyboard 11 or mouse 13, and at step S5-3 product selection data is transmitted to the vendor terminal 21 by transmitting signals 17 from the modem 55 connected to the purchaser

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terminal 5 to the modem 55 connected to the vendor terminal 21 via the internet 19. The product selection data is received by the vendor terminal 21 at step S5-5. At step S5-7, the vendor terminal 21 compares the product selection data to a product database to determine the price of the product and at step S5-11 the price and any necessary delivery terms data are transmitted to the purchaser terminal 5. At step S5-13 the purchaser terminal 5 receives the price and delivery terms data, which data is then displayed to a user at step S5-15. The purchaser terminal 5 then receives acceptance input from the user at step S5-17 and at step S5-19 the terminal 5 processes the input from the user to determine whether the user accepted the price and delivery terms. If the price and delivery terms are not accepted, then at step S5-21 the purchaser terminal 5 transmits that the terms are not accepted to the vendor terminal 21 which is received at step S5-23. The transaction process then ends. If the user does accept the price and delivery terms, then at step S5-25 the purchaser terminal 5 transmits that the terms have been accepted and at step S5-27 the vendor terminal 21 receives that the terms have been accepted. Following this, the selection of product and agreement of price and delivery terms is complete and referring again to Figure 5 processing then continues to step S4-3.

Establish Secure Link

The processing of step S4-3 is shown in more detail in Figure 7. At step S6-1, the vendor terminal 21 transmits

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a request for the purchaser to identify how payment is to be made. At step S6-3, that request is received at the purchaser terminal 5 and at step S6-5 the purchaser terminal 5 transmits that the payment system of the present embodiment is to be used, ie payment using the smart-cards 3,23. This is received at step S6-7 by the vendor terminal 21.

Once it has been established that the payment system of the current embodiment is to be used, control passes to the smart-cards 3,23 which establish a secure session between themselves. This is achieved, in this embodiment, using so called public key encryption where each party transmits to the other a public key with which data should be encrypted. It is only possible to decrypt the encrypted data using a private key which is retained by each party. The present embodiment uses a modified public key encryption scheme which allows a new, unique session ID to be used for each transaction in connection with the asymmetric key pair.

The setting up of the secure session begins at step S6-9 where the vendor smart-card 23 transmits its public key from its key store 78 to the purchaser smart-card 3. The purchaser smart-card 3 receives the public key from the vendor smart-card 23 at step S6-11 and stores it in its key store 78. Next, at step S6-13, the purchaser smart-card 3 generates, using the session ID generator 72, a purchaser session ID which it appends to all communications transmitted to the vendor smart-card 25

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during the current session. In the present embodiment, the purchaser session ID takes the form of a block of data made up of a time stamp, a random number, a terminal ID and a card ID, all encrypted using the purchaser smart-card's public key (so that only the purchaser smart-card 3 can decrypt the purchaser session ID). Then at step S6-15, the purchaser smart-card 3 encrypts the purchaser session ID using the vendor smart-card's public key and transmits this to the vendor smart-card 23, along with its own public key. At step S6-17, the vendor smart-card 23 receives and decrypts the data to recover the purchaser session ID and the purchaser public key, which it stores within the session ID store 76 and the key store 78 respectively of the vendor smart-card 23. Next, at step S6-19, the vendor smart-card 23 generates a vendor session ID using its session ID generator 72. In the present embodiment, the vendor session ID comprises a time stamp, a random number, a terminal ID and a card ID, all encrypted using the vendor smart-card's public key (so that only the vendor smart-card 23 can decrypt the vendor session ID). At step S6-21, the vendor smart-card 23 then encrypts the vendor session ID using the purchaser smart-card's public key and transmits it to the purchaser smart-card 3. At step S6-23, the purchaser smart-card 3 receives and decrypts the data to recover the vendor session ID which it stores in its session ID store 76. At step S6-25, the purchaser smart-card 3 transmits a message to the vendor smart-card 23 stating that the vendor session ID has been received,

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which message is received by the vendor smart-card 23 at step S6-27.

5 The session ID generated by each of the purchaser smart-card 3 and the vendor smart-card 23 will be different for a given session (because of the time stamp and the random number), but they will be inextricably linked to the one session and the two smart-cards. In the present embodiment, the session IDs are added to every transfer
10 of data passing between the terminals after it has been established that the payment system of the present embodiment is to be used. This will take the form of appending both session IDs to the end of the message and then encrypting the whole with the recipient's public
15 key. By performing the encryption each message is protected from being read by an unauthorised party, and by using the session ID each message is digitally signed to certify that the sender of the data is who they claim to be and that the message is valid. It should be noted
20 that only the purchaser smart-card 3 and the vendor smart-card 23 will be able to: validate the session IDs, encrypt data and decrypt data. The cards will be use their own encryption engines 74 for this purpose, rendering it unnecessary for the terminals to be secure
25 devices.

Part of the session will include the transmission of a user input such as acceptance or refusal of validation information supplied and/or delivery data. This will be
30 entered as plain text (i.e. unencrypted and uncoded) by

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the vendor or purchaser and then passed to the local smart-card for appending of session IDs, encryption and transfer to the other party. Again, it is not necessary for the terminal to be a secure device.

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Purchaser Validation

Referring now to Figure 8, the processing steps to perform the validation of a purchaser (step S4-7) will now be described.

10 First, the vendor or vendor terminal 23 must determine the level of validation required at step S7-1. Note that if it is determined at step S4-5 that no validation is required, then the processing steps shown in Figure 8 will not be undertaken. In this embodiment, the level of
15 validation may be selected manually by the vendor, in which case validation options will be displayed by the vendor terminal 21 on monitor 9 and which will then await an input from the vendor via the keyboard 11 or the mouse 13. Alternatively, the level of validation may be
20 selected by the vendor terminal automatically, in which case the characteristics (eg value, nature etc) of the transaction will be compared to a predetermined set of rules for deciding the level of validation required.

25 Once the level of validation has been determined, the vendor terminal 21 will transmit a request for the purchaser validation at step S7-3 indicating the level of validation required. In the present embodiment, it is assumed that a relatively low level of validation is
30 required. Therefore the validation request is sent to

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the purchaser terminal 5, not the registry 25. At step S7-5, the purchaser terminal 5 receives the validation request and at step S7-7 transmits the requested validation data (which may either be input by the purchaser or is stored in the validation store 70 of the purchaser smart-card 3). At step S7-9 the vendor terminal 21 receives the validation data and at step S7-11 determines whether the validation data received is acceptable. This is done either automatically by comparing the received validation data with pre-stored data or manually by displaying the validation data to the vendor and awaiting confirmation from the vendor that it is acceptable. If the validation data is unacceptable then processing continues at step S7-13 where the vendor terminal 21 transmits to the purchaser terminal 5 that the validation data provided was unacceptable. This is received at step S7-15 by the purchaser terminal 5 and then the transaction process ends. Alternatively, if the validation data is acceptable, processing continues at step S7-17 where the vendor terminal 21 transmits to the purchaser terminal 5 that the validation data provided was acceptable and at step S7-19 the purchaser terminal 5 receives this. The validation of the purchaser is then complete and, referring again to Figure 5, processing continues at step S4-9.

Vendor Validation

If it is decided at step S4-9 that validation of the vendor is required, as described above, then the steps shown in Figure 9 are performed (step S4-11). The

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processing of Figure 9 is substantially the same as the processing of Figure 8, except that it is the purchaser terminal 5 requesting the validation data and the vendor terminal 21 transmitting it.

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Thus at step S8-1, the purchaser terminal 5 determines the level of validation that is required in substantially the same manner as described above with reference to purchaser validation in Figure 8, following which it transmits a vendor validation request either to the vendor terminal 21 or to the registry 25 at step S8-3. In the present embodiment it is assumed that a relatively low level of validation is required. Therefore the validation request is sent to the vendor terminal 21, not the registry 25. On receiving the vendor validation request at step S8-5, the vendor terminal 21 transmits, at step S8-7, the requested validation data (which may either be input by the vendor or is stored in the validation store 70 of the vendor smart-card 23). Following receipt of the validation data by the purchaser terminal 5 at step S8-9, the purchaser terminal 5 determines at step S8-11 whether the validation data is acceptable. This is done either automatically by comparing the received validation data with pre-stored data or manually by displaying the validation data to the purchaser and awaiting confirmation from the purchaser that it is acceptable. If the validation data is decided to be unacceptable, then at step S8-13 the purchaser terminal 5 transmits to the vendor terminal 21 that the validation data is not acceptable and the vendor terminal

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21 receives this at step S8-15 following which the transaction process terminates. If, however, the validation data is determined to be acceptable at step S8-11, then at step S8-17 the purchaser terminal 5 transmits to the vendor terminal 21 that the validation data is acceptable. This acceptance is received by the vendor terminal 21 at step S8-19 following which the validation of the vendor is complete and, referring again to Figure 5, processing continues at step S4-13.

Confirm Delivery Data

If it is determined at step S4-13 that delivery is required, then the delivery data must be confirmed at step S4-15. This process is shown in more detail in Figure 10.

At step S9-1, the vendor terminal 21 requests the delivery data, that is the delivery address (which may be a postal address or an e-mail address, for example) and the name of the person or company to whom the items should be directed. At step S9-3, the purchaser terminal 5 receives the delivery data request and displays on monitor 9, at step S9-5, a request for a user to enter delivery data. At step S9-7, the purchaser terminal receives the delivery data input from the user via the keyboard 11 or the mouse 13 and at step S9-9 transmits the delivery data to the vendor terminal 21. The vendor terminal 21 then receives the delivery data at step S9-11, following which the process of confirming delivery

data is complete and, referring again to Figure 4, the processing will continue at step S4-17.

Payment and Receipting

5 Performing payment and receipting (step S4-17) will now be described in greater detail with reference to Figure 11. As mentioned above, control of the payment and receipting is carried out in this embodiment by the smart-cards 3,23.

10 Starting at S10-1, the vendor smart-card 23 transmits a request for payment to the purchaser smart-card 3. At step S10-3, the purchaser smart-card 3 receives the request and at step S10-5 transmits the payment data to

15 the vendor smart-card 23. At step S10-7, the vendor smart-card 23 receives the payment data and at step S10-9 transmits a receipt for the payment. At this time, the vendor smart-card 23 has received the payment data but has not accepted the payment described therein. The

20 purchaser smart-card 3 then receives the receipt at step S10-11. At step S10-12, the purchaser smart-card 3 validates the receipt by checking that the purchaser session ID has been appended to the receipt data and that it matches its purchaser session ID stored in the session

25 ID store 76. If the purchaser session ID is not present and correct, then at step S10-13, the purchaser smart-card 23 transmits an error message to the vendor smart-card 23 stating that the session ID is incorrect. This error message is received by the vendor smart-card 23 at

30 step S10-14 following which the transaction process ends.

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On the other hand, if it is determined at step S10-12 that the purchaser session ID is present and correct, then at step S10-15 the purchaser smart-card 3 transmits an acknowledgement that the receipt has been received.

5 This acknowledgement is received by the vendor smart-card 23 at step S10-16, following which the vendor smart-card 23 validates the acknowledgement by checking that the vendor session ID has been appended to the acknowledgement data and that it matches the vendor

10 session ID stored in the session ID store 76. If the vendor session ID is not present and correct, then at step S10-18 the vendor smart-card 23 generates an error message stating that the vendor session ID is not present and transmits it to the purchaser smart-card 3 which

15 receives the message at step S10-19 following which the transaction process ends. If on the other hand, however, it is determined at step S10-17 that the vendor session ID is present and correct, then processing continues at step S10-20 where the vendor smart-card 23 finalises the

20 order data and accepts the payment data, thereby actually receiving the payment, to complete the transaction. The receipt and acknowledgement are validated by each smart-card 3 and 23 to ensure the session remains intact. The transaction can only be completed if both smart-cards 3

25 and 23 complete this test successfully. Thus the payment process is inextricably linked to the purchase transaction, the validation of the parties and acceptance of all terms into a single transaction session including user input of validation acceptance and possible delivery

30 details. Once the session has been validated as complete

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the vendor smart-card 23 transmits, at steps s10-21, a message to the purchaser terminal 5 to indicate that the transaction is complete. At step S10-22 the purchaser smart-card 3 receives the transaction complete message following which the transaction process terminates. Following completion of the transaction, the purchaser terminal 5 and smart-card 3 may then be used to perform other actions unconnected with the purchase.

10 **Validation level determination**

As described above, it is necessary to determine at step S7-1 and S8-1 the level of validation of the other party to a transaction that is required. For example, one party may wish to validate the address and other credentials (such as age, legal status or credit worthiness) of the other party and also to be guaranteed that purchased goods will be delivered intact and possibly to a given quality. As discussed above, some of this information, such as name, age or address, is held in the validation store 70 on the smart-card of the user and this information plus further information may be held by the registry 25. Either party may opt for more or less information from the registry 25, and/or a greater or lower level of guarantee. The registry 25 may implement a charging structure to enable users of the payment system to be charged for information held by and requested from the registry 25, or to charge users for storing and providing their data to others. Different levels of payment will be required depending on the amount of validation data held by the registry.

In all trades made using the payment system of the present invention, the complete trade, that is selection of goods, agreement to purchase, payment and subsequent expected delivery are based on the honesty of the two parties and their acceptance of each other's *bona fides* and mutual acceptance of the terms of trading. The payment system does not apply any specific trading rules of its own and it is up to both parties to agree terms that overcome any doubts a party may have regarding the other party and the trade. The payment system provides electronic packaging of a negotiation between the parties such that value does not move from one party to the other until both parties are satisfied with the terms.

Thus, each party is able to decide upon the level of trust it has in the other party and if insufficient, to make use of the registry 25 as necessary until satisfied. For example, two parties trading for the first time may both seek the top level of guarantee from the registry 25. However, as the parties get to know one another, the trust level between them will increase and their reliance on the registry 25 will decrease.

Further Embodiments

The first embodiment discussed above made no use of the registry 25 for validation or for payment, as it was assumed that only a low level of validation was required and payment was made directly from the purchaser smart-card 3 to the vender smart-card 23. However, either or both parties to a transaction may wish to validate the

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other party with the registry 25 or make payment to or from a registry account card 33. Where the registry 25 is to be involved in a transaction, session IDs are generated as described above with reference to Figure 7, to include the registry (for validation data) and each registry account card used (for payment) in a secure session. Where the registry 25 is to interact with the purchaser and vendor, a separate secure session with its own session ID pair is generated between the registry 25 and the vendor smart-card 23 and between the registry 25 and the purchaser smart-card 3. However, if only one of the vendor and purchaser needs to contact the registry 25 then a session having a new session ID pair will be generated between the registry 25 and the vendor smart-card 23 or the purchaser smart-card 3. Thus the overall transaction will be made up of a number of sessions, each session having its own session ID pair. In this embodiment, to ensure a common reference between the various sessions making up the transaction, each party uses the same session ID in each session of a given transaction. For example, if the purchaser smart-card 3 has already established a session with the vendor smart-card 23 (and has thus created a purchaser session ID), and then requires a session with the registry 25, the purchaser session ID used in the session with the registry 25 will be the same as the purchaser session ID already used in the session with the vendor smart-card 23. Obviously, the vendor session ID and the registry session ID will be different to one another.

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Referring now to Figure 12, there will be described a method of performing validation of the purchaser using validation data held by the registry 25 in which the purchaser is informed of the decision to validate at the registry 25 and has the option to refuse such validation. Such processing would take the place of the processing described with reference to Figure 8 above in the first embodiment. It is assumed in the method shown in Figure 12 that the registry 25 and the vendor smart-card 23 have already established a secure session by means of a process similar to that set out above with reference to Figure 7.

At step S11-1, the level of validation required is determined as in step S7-1. Next, at step S11-3, the vendor terminal 21 transmits a request for validation at the registry 25 to the purchaser terminal 5. At step S11-5, the purchaser terminal 5 receives the request and at step S11-7 decides whether or not to agree to the level of validation requested. This decision is either made automatically by the purchaser terminal 5 according to predetermined rules set by the purchaser or manually by presenting the request to the purchaser on monitor 9 and awaiting acceptance or refusal of the request from the purchaser via the keyboard 11 or mouse 9. If the requested level of validation is not acceptable, then processing continues at step S11-9 where the purchaser terminal 5 transmits a disapproval of the validation request to the vendor terminal 21. The disapproval is

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received by the vendor terminal 21 at step S11-11,
following which the transaction process terminates.

On the other hand, if the requested level of validation
5 is agreed, then processing continues at step S11-13, at
which step the purchaser terminal 5 transmits an approval
of the validation request to the vendor terminal 21.
Following receipt of the validation approval at step S11-
15, the vendor terminal 21 transmits a validation request
10 (identifying the purchaser) to the registry 25 at step
S11-17. At step S11-19, the registry 25 receives the
validation request from the vendor terminal 21 and at
step S11-21 transmits the appropriate validation data
back to the vendor terminal 21. The validation data is
15 received by the vendor terminal 21 at step S11-23.
Processing then proceeds as described above with
reference to Figure 8 such that the processing of steps
S11-25 to S11-33 corresponds to the processing of steps
S7-11 to S7-19.

20 Another alternative to the processing of Figure 8 is
shown in Figure 13. In this Figure, validation of the
purchaser is performed at the registry 25 but the
purchaser terminal 5 is given no notice that the vendor
25 terminal 21 is to receive validation data from the
registry 25. It is assumed in the following description
that the registry 25 and the vendor smart-card 23 have
already established a secure session by means of a
process similar to the one described with reference to
30 Figure 7 above.

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At step S12-1, the level of validation required is determined as in step S7-1. At step S12-3, the vendor terminal 21 transmits to the registry 25 a request for validation of the purchaser, which request is received by the registry 25 at step S12-5. At step S12-7, the registry 25 transmits the validation data, which is then received by the vendor terminal 21 at step S12-9. Processing then continues as for Figure 8 with the processing of steps S12-11 to S12-19 corresponding to the processing of steps 7-11 to steps 7-19.

A further method of validation will now be described with reference to Figure 14. In this Figure it is the vendor which is being validated, however it should be understood that all methods of validation can be used to validate either the purchaser or the vendor or both. It is assumed in the following description that the registry 25 and the vendor smart-card 23 have established a secure session and that the registry 25 and the purchaser smart-card 3 have established a secure session by means of processing similar to that described with reference to Figure 7 above.

At step S13-1, the level of validation required is determined as for step S8-1. At step S13-3, the purchaser terminal 5 transmits to the registry 25 a request for validation of the vendor. Following receipt of the validation request by the registry 25 at step S13-5, the registry 25 transmits to the vendor terminal 21 at step S13-7 a request for permission to validate. The

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request is received at step S13-9 by the vendor terminal 21, and at step S13-11 it is decided whether to agree to the level of validation requested in substantially the same manner as described above with reference to Figure 12. If the level of validation is not agreed to then processing continues at step S13-13 where the vendor terminal 21 transmits a disapproval of the validation request to the registry 25, following which the registry 25 receives the validation disapproval at step S13-15. The transaction processing then ends.

On the other hand, if it is decided at step S13-11 that the level of validation requested is agreed, then at step S13-17, the vendor terminal 21 transmits a validation approval to the registry 25, which approval is received by the registry 25 at step S13-19. At step S13-21, the registry 25 then transmits the validation data to the purchaser terminal 5 which receives the validation data at step S13-23. Following this, the processing continues as in Figure 9 with the processing of steps S13-25 to S13-33 corresponding to the processing of step S8-11 to S8-19.

It is also possible for payment to take place in a number of different ways. For example, as mentioned above, the registry 25 may hold account cards 33p, 33v on behalf of users of the payment system in a smart-card server 27. The presence of these account cards make it possible for a prospective purchaser to have a large volume of funds available to spend using the payment system without

having to have those funds tied into the card which they carry, which card could be lost or stolen thereby denying the user access to those funds. It is therefore possible that a purchaser may wish to make a payment from his or her account card 33p or a vendor may wish to have a payment made to his or her account card 33v. If such a payment is to take place, then this will be agreed between the parties before payment is made. If the purchaser or the vendor decides to make payment from or to receive payment from a registry smart-card 33, then the purchaser or the vendor smart-card is informed of this and in response, it provides account details of the appropriate registry smart-card 33, from its registry data store 82. This information is then transmitted to the other smart-card so that the appropriate secure session can be established between the other smart-card and the registry smart-card. Examples of these will now be described with reference to Figures 14 to 16.

Referring now to Figure 15, there will be described payment and receipting steps to replace those described above with reference to Figure 11 where a purchaser pays from funds held on their smart-card 3 to a registry account smart-card 33v held on the vendors behalf. It is assumed in the following description that the vendor registry account card 33v and the vendor smart-card 23 have already established a secure session and that the vendor registry account card 33v and the purchaser smart-card 3 have already established a secure session by means

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of processing similar to that described with reference to Figure 7 above.

At step S14-1, the vendor smart-card 23 transmits to the purchaser smart-card 3 a request for payment, which request is received at step S14-3. At step S14-5, the purchaser smart-card 3 transmits the appropriate payment to the vendor account card 33v at the vendor account card 33v registry 25, which payment is received by the vendor account card 33v at step S14-7. At step S14-9, the vendor account card 33v then transmits to the vendor smart-card 23 an acknowledgement that the payment has been made which acknowledgement is received at step S14-11 by the vendor smart-card 23. The receipting process now continues as in Figure 11 with the processing of steps S14-13 to S14-25 corresponding to the processing of steps S10-9 to S10-21.

Referring now to Figure 16, there will be described a method of payment to the vendor's smart-card 23 from the purchaser's registry account card 33p. It is assumed in the following description that the purchaser smart-card 3 has already transmitted account details of the purchaser's registry account card 33p to the vendor smart-card 23, that the registry account card 33p and the vendor smart-card 23 have established a secure session and that the purchaser registry account card 33p and the purchaser smart-card 3 have already established a secure session by means of processing similar to that described with reference to Figure 7 above.

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At step S15-1, the vendor smart-card 23 requests payment from the purchaser smart-card 3. Following receipt of the request for payment by the purchaser smart-card 3 at step S15-3, the purchaser smart-card 3 transmits, at step 5 S15-5, to the purchaser's registry account card 33p, an instruction to make the payment. At step S15-7, the registry account card 33p receives the payment instruction and at step S15-9, it transmits the payment to the vendor smart-card 23. The payment is received by 10 the vendor smart-card 23 at step S15-11, following which the receipting procedure proceeds as in Figure 11, whereby the processing of steps S15-13 to steps S15-25 corresponds to the processing of steps S10-9 to S10-21.

15 Referring now to Figure 17, there will be described the processing where payment is made from the purchaser's registry account card 33p to the vendor's registry account card 33v. It is assumed in the following description that the purchaser smart-card 3 and the 20 vendor smart-card 23 have received details of the other's registry account cards 33p, 33v; that the two registry account cards 33p and 33v have already established a secure session between each other; that the purchaser registry account card 33p and the purchaser smart-card 25 3 have already established a secure session between each other; and that the vendor registry account card 33v and the vendor smart-card 23 have already established a secure session between each other.

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At step S16-1, the vendor smart-card 23 transmits a request for payment to the purchaser smart-card 3, which request is received at step S16-3. At step S16-5, the purchaser smart-card 3 transmits a payment instruction to the purchaser's registry account card 33p, which payment instruction is received at step S16-7. The purchaser account card 33p then effects the payment to vendor's registry account card 33v at step S16-9. At step S16-11, the vendor's registry account card 33v transmits a payment acknowledgement to the vendor smart-card 23 which acknowledgement is received at step S16-13. Thereafter, the receipting process between the purchaser smart-card 3 and the vendor smart-card 23 continues as in Figure 11, with the processing of steps S16-15 to S16-27 corresponding to the processing of steps S10-9 to S10-21.

A further optional feature of the payment system described in any of the above embodiments is that a smart-card for use with the payment system may hold funds in a number of different currencies. It will be possible to load funds onto a purchaser's smart-card 3 or registry account card 33p in the required currency or it would be possible to convert funds held on the card. Conversion between currencies could take place on a particular user card 3 or 23 or, as would be preferable from a fraud control point of view, conversion could be undertaken on a user's registry account card 33 under the control of the registry 25 to prevent fraudulent currency creation. The process of currency conversation does not entail the

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actual conversion of one currency into another, rather it implies debiting an amount in one currency and crediting the equivalent amount in another currency. The implications of this are twofold;

- 5 1) external (off card) funds must be held in the currency to be supplied;
- 2) the exchange rate will be externally (off card) supplied.

10 An example of how conversion of funds within a registry account card 33 could be accomplished by a user will now be described with reference to Figure 18.

15 Before the currency conversion process may commence, a secure session between the user's own card 3 or 23 and the registry card 33p or 33v, respectively must be established. This is achieved in the same manner as described above with reference to Figure 6. Thus steps S17-1 to S17-19 correspond to steps S6-9 to S6-27 in that the user card 3 transmits its public key to the registry

20 card which, following receipt of the user card public key, generates a registry session ID in the same manner as the session IDs were generated with reference to Figure 7 above. The registry smart-card 33p or 33v then encrypts the registry session ID with the cardholder

25 public key and transmits the encrypted session ID and the registry public key back to the user smart-card 3. The user smart-card 3 then generates a user session ID, encrypts it with the registry public key and transmits the encrypted user session ID to the registry. Once the

30 registry smart-card 33p or 33v has received the encrypted

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user session ID, it transmits a message to the user card 3 stating that the session ID was received successfully. Following this, at step S17-21 the cardholder terminal 5 transmits a request for conversion of account funds from a first currency to a second currency which request is received by the registry 25 at step S17-23. At step S17-25, the registry 25 performs a check to determine whether the account card 33 holds sufficient funds to perform the currency conversion. If it is determined that sufficient funds are not present, then processing continues at step S17-27, where the registry 25 transmits to the cardholder terminal 5 that there are insufficient funds in the account card 33p to perform a conversion. This is received by the cardholder terminal 5 at step S17-29, following which the conversion procedure terminates. On the other hand, if it is determined at step S17-25 that there are sufficient funds in the account to perform the currency conversion then at step S17-31 the funds are converted and at step S17-33 the registry 25 transmits to the cardholder terminal 5 a confirmation that the funds have been converted and a note of the funds totals in the relevant currencies available on the registry account card following the conversion. This is received by the card holder terminal 5 at step S17-35, following which the currency conversion procedure terminates.

A further feature which may be applied to the payment system according to any of the described embodiments is that transaction logging may be undertaken. At the end

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of a given transaction, both the vendor and purchaser will have stored in the transaction log store 80 of their respective smart-cards 3, 23 a record of all of the data transferred during the transaction. This record will
5 include the goods or services specified, any validation data concerning the purchaser or vendor, any delivery data and payment data. Each party to the transaction therefore has a complete record of that transaction. A limited number of such transaction records may be held
10 by the smart-card 3, 23 to provide a short-term transaction log. However, due to the memory limitations of smart-cards, it is not likely to be possible for the smart-card to store a complete log of all transactions in which the particular smart-card 3, 23 is involved.
15 Therefore, the smart-cards are programmed to allow the transaction records to be copied from the transaction log store 80 into a full transaction log within a personal computer or the like. For example, a vendor may set up an automatic process through their usual vending terminal
20 such that at the completion of any transaction, a copy of that transaction record is made on a central transaction log held within the vendor terminal or in a further terminal which is connected to the vendor terminal. A purchaser may for example, have a home
25 computer comprising a smart-card reader into which the user smart-card 3 may be inserted such that records of purchases made using the smart-card 3 may be transferred to a log on the home computer. In addition, the registry 25 may be configured to automatically save
30 details of all transactions in which it is involved in

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order to provide a centralised accountability for the payment system.

5 In the above embodiments, different levels of validation were described. Some practical trading examples will now be described that illustrate how these different levels of validation would be used.

Validation Level Examples

10 **Internet Trading Example 1**

In this example, a user of the payment system wishes to purchase weather forecast data from the UK Meteorological Office. The purchaser knows he is at the Meteorological Office website and trusts them to deliver the requested information. There is no reason for the purchaser to carry out any further checking on the vendor. The Meteorological Office does not care who the purchaser is or where they are located. The information to be purchased is not restricted in any way. In addition, the Meteorological Office will collect payment from the purchasers smart-card before shipping the requested information. So the vendor requires no further information about the purchaser and an immediate anonymous trade can take place subject to both parties indicating their satisfaction with the price and terms of trade.

25 **Internet Trading Example 2**

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In this example, the purchaser wishes to buy videos from an internet discount store. In this case the value of the trade will be low but checking is required by both parties. The vendor will wish to assure itself that the purchaser is of a suitable age to purchase the videos requested, while the purchaser will wish to validate the credentials and location of the vendor to ensure that the vendor will not simply take the purchaser's money and disappear, never delivering the goods.

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The vendor could simply ask a purchaser for their age and address but there would be no support for this information, which therefore could not be trusted. The vendor would therefore check the credentials of the purchaser with the registry 25 and if the purchaser was not registered or refused to permit the information to be released, the vendor could refuse to sell the products to this purchaser. If the information were provided, only a low confidence level would probably be required and the registry 25 would provide no warranties or guarantees.

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The purchaser would wish to be assured that the vendor can be trusted. To achieve this, the purchaser would check that the vendor had a registry account and that the vendor would allow the registry 25 to release/confirm the address of the vendor. Only under these circumstances would the purchaser agree to make the trade.

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When both parties are satisfied with the information supplied, the sale price, the transaction charges and the terms of trading, the sale would be completed and value transferred. In subsequent trades between the two parties, it is likely that the purchaser will have built up a level of trust in the vendor such that the purchaser will not seek any validation from the registry.

Internet Trading Example 3

This example concerns the purchase of fine art. In this circumstance a great deal of checking and validation will be required. Even though the vendor will be paid immediately, the vendor may need to verify the nationality and domicile of a purchaser. The vendor may also wish to avoid being part of a possible money laundering exercise and will therefore seek the most exhaustive credentials concerning a purchaser with the highest level of confidence.

The purchaser will also need to have more guarantees than simply the credentials of the vendor. Since the fine art cannot be authenticated until it is shipped (or the benefit of using the internet will be lost), and since the goods may be damaged in transit, the purchaser may seek a cash back guarantee from the smart-card registry 25. For this purpose, the registry 25 may be underwritten to supply such a guarantee with the properly authenticated vendors but of course is likely to levy a high transaction charge for this service.

Once all parties have agreed to the levels of confidence they have been given, agreed prices, transaction charges and terms and conditions, the trade may be completed. Given the high value of the deal, it is likely that
5 payment will be made from an account card held by the registry on the purchaser's behalf, rather than his or her personal card. In addition, it may be possible for the registry operator to function as a credit providing service such that users of the payment system may be able
10 to borrow money from the registry to be paid back at a later date as with a traditional credit card 25.

Real World Trading Example 1

15 For the purpose of purchasing goods such as a newspaper the smart-card of the payment system according to the present invention may be used as a "traditional" electronic purse at any shop accepting the card. To make a newspaper purchase the cardholder will simply use his
20 or her card in an anonymous manner to make the purchase using a purchaser smart-card reader provided within the shop.

Real World Trading Example 2

25 For the purchase of a larger value item such as a television, the purchaser may have sufficient value on their personal card to make payment or they may indicate their desire to pay from the registry account card in
30 much the same way as a traditional bank debit card

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payment. In either event, the vendor will wish to validate the credentials of the purchaser to check that the card has not been lost or stolen and that a registry account is not being fraudulently used. In the case of
5 account payment, the vendor will also take payment from the registry 25.

For this purpose the vendor will need a simple smart-card terminal capable of connectivity either directly to the
10 registry or via the internet. Such terminal may be similar to the bank/credit card terminal currently in use for debit and credit card payments. Since the purchaser is physically in the vendor's shop it is unlikely that they will seek any further accreditation of the vendor,
15 however this is always possible. For example, the purchaser may wish to obtain guarantees about the delivery date and goods quality for purpose made goods. To achieve this, the purchaser will make use of a vendor's terminal to contact the registry and seek the
20 necessary guarantees. Once all terms have been agreed, the purchaser can authorise payment to be made in exactly the same way as in the case with internet trading.

Real World Trading Example 3

25 Booking or purchasing a ticket from an unattended terminal is the same as internet trading. For ticket purchases, it will be possible for a physical paper ticket to be issued via the terminal, for a ticket to be
30 delivered to the vendor following the purchase

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transaction at the terminal or for an electronic ticket to be written to the purchaser's smart-card. This is possible because a smart-card is not restricted to holding programs and/or data for a single purpose but may have a number of separate application entities on the same card. In particular, technologies such as Sun Microsystems Inc's JavaCard™ technology allow applications to be written to a smart-card at any time. Thus the user of a smart-card equipped with programming to perform processing to enable it to participate in the payment system of the present invention could decide that the ability to have electronic tickets written to his or her card would be useful and therefore arrange for software to enable that function to be written to his or her card at any time.

Although it has been described above with reference to Figures 1 to 16 that the purchaser terminal 5 and the vendor terminal 21 are physically separated and connected via the internet, it is possible that a cardholder may wish to use their smart-card at the vendor's location. This situation is discussed in the above trading examples, and is shown in a simplified form in Figure 19. In Figure 19, the vendor terminal 21 having a monitor 9, a keyboard 11 and a mouse 13, which terminal may be combined with or a part of a shop cash register or till, is equipped with a smart-card reader 31 into which the vendor smart-card 23 may be inserted. For security purposes it may be preferable for the smart-card slot 31 to be physically separated from the terminal 21 and

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connected via a cable or other data communications link because the terminal 21 may be in an area accessible to customers and having the smart-card 23 in such a location could be perceived to be a security risk. As before, the vendor terminal 21 is equipped with a modem 15 by means of which it may communicate with the registry terminal 25 by transmitting signals 17 via the internet 19 or by a telephone line.

Also connected to the vendor terminal 21 is a user smart-card reader 34 into which the user smart-card 3 may be inserted by a purchaser when a purchase is to be made using the payment system of the present embodiment. In such circumstances, there is obviously no need for communication between the purchaser smart-card 3 and the vendor smart-card 23 to take place via the internet and thus the same process as described above with reference to flow diagrams 4 to 16 may be performed as shown but with communication between the cards 3 and 23 taking place via the cables connecting the user smart-card reader 34 to the vendor smart-card reader 31.

It should be noted that in the above-described arrangement, the vendor and purchaser smart-cards still create a secure session to wrap the transaction to provide full transaction accountability and traceability, to provide a secure channel between the cards to transfer funds, and to enable data to be certified, all as described above.

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In the event that either the purchaser or the vendor should wish to validate the other party at the registry or make payment from or receive payment to a registry account card this may be achieved using the internet connection to the registry terminal 25.

Referring to Figure 20, there is shown a block diagram of the main functional components of the vendor terminal 21 used in this embodiment. As before, a CPU making use of a working memory 43 to perform instructions stored in software store 47, a keyboard and mouse interface 49 to receive input from a user and a monitor interface 51 to output information to a user are present and are connected via a data bus 45. Also connected via the data bus 45 is the modem 55 for communication with the registry terminal 25 via the internet 19 or telephone line. The vendor smart-card reader interface 59 and the purchaser smart-card reader 61 are also connected to the data bus 45.

Although it has been described above that the various terminals communicate with one another via the internet, the terminals may be connected together via a Local Area Network (LAN) or a Wide Area Network (WAN). In addition, it is possible that the terminals could perform a so-called "tunnelling" operation to create a Virtual Private Network (VPN) between the terminals across the internet, or a direct dial telephone link between the terminals may be used.

Although it has been described above that where particular validation data or particular delivery terms are decided to be unacceptable the transaction process terminates, further negotiations between the two parties could be undertaken to resolve such situations. For example, a prospective purchaser may select a product and request next day delivery, but then decide that the cost for next day delivery is more than he or she is willing to pay. It could be made possible for the prospective purchaser to request to be offered a cheaper delivery service which they might then accept.

Although it has been described above, particularly with reference to Figure 5, that validation of a purchaser is performed before validation of the vendor, it is not essential that the validations are performed in this order and therefore validation of a vendor could be performed before validation of the purchaser or even at the same time.

Although, it has been described above with reference to Figure 5 that a step is taken to determine whether or not to validate the purchaser or vendor followed by which the level of validation required is determined, it is possible that these two steps could be combined into one single operation, wherein if no validation is required the steps to achieve validation could be omitted.

Although it is described above with reference to Figure 9 that a purchaser is required to enter delivery data when

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required, it is possible that such data could be stored within the purchaser terminal or purchaser smart-card and the transfer of such data to the purchaser terminal could be achieved without reference to the purchaser.

5

Although it is described above that the registry 25 stores validation data, it is possible that the validation data could be stored on the registry account card 33v, 33p.

10

Although it is described above that a single registry 25 is present, it is possible that a number of registries could exist. In this case it would become necessary to establish which registry should be queried to receive validation data from the party to be validated. For simplicity, this information is preferably stored on the party's smart-card.

15

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Although it has been described with reference to Figure 4 that delivery data is transmitted after validation, it is entirely possible to include delivery data within the validation data. This is a favourable modification to the above system as it is likely that validation data would include address data and therefore duplication of data can be reduced and thus transaction processing time can be reduced. The delivery data would always be transmitted after establishing the session, but need not necessarily be encrypted.

25

Although it has been described above with reference to Figure 7 that a specific security arrangement is used to establish the secure session, it is to be noted that the security algorithms used by the smart-cards and the operation of the security engine on the smart-cards does not matter, provided that an asymmetric key system of the type used in public key encryption is used. Examples of encryption schemes which could be used are RSA type algorithms and elliptic curve techniques. However, it is not an open public key system requiring a certification authority to validate ownership, rather it is a private system known only to the smart-cards themselves.

Although it has been described above with reference to Figure 7 that all data passing between the terminals (and the registry) will be encrypted by the smart-card 3, 23, 33 in the terminal (or registry) before transmission, it is not necessary for all data to be encrypted. Only the data which the parties do not wish to be general public knowledge (which could happen if the data were intercepted) and the data which requires certification as to its origin and validity (such as validation data), and therefore requires a "digital signature", need be encrypted. As those skilled in the art will appreciate, the function of the secure session IDs of digitally signing the transmitted data to certify validity and origin could be achieved by methods other than that described above. In particular, a number of techniques of so-called "digital water-marking" exist, which could

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be used to certify the data, or encryption keys themselves could be used as signatures.

5 Although it has been described above that the various terminals have specific components and arrangements, it is sufficient for the performance of the embodiments that any stand alone terminal has a card reader, a means for presenting data to and requesting data from a user, means for receiving user input and means for communicating with
10 other terminals. Thus it is not necessary for the terminal to be a desk-top computer. It is possible that terminals may take the form of railway, airline or bus ticket vending machines, public information booths or terminals, theatre or cinema ticketing booths, shop
15 tills, portable computers, hand-held computers and information appliances, telephones and tourist attraction entry gates, for example. As those skilled in the art will appreciate, the present invention can be used not only from a purchaser's own home terminal but from
20 terminals in so-called internet cafes and in other public terminals.

25 Although it has been described above with reference to Figures 11 to 16 that the registry or a registry account card is included in the secure session before a request for validation data or payment is made to the registry or account card, it is possible that the registry or registry account card will only be included in the secure session when validation data or payment is requested.

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Although it has been described above that a user would hold funds on their user smart-card and may hold further funds on their registry account card, it is possible to operate the entire system in the manner of a credit card system whereby a user holds no funds on their own smart-card or on their registry account card, but every time they wish to make a purchase requesting payment from the registry account, and funds being provided to the registry account by the registry on a credit basis with the money supplied as credit to be repaid by the user according to predetermined practices. It is also possible for the system to be operated in a combination of a stored cash and credit based system whereby a user may store small amounts of cash on their personal smart-card or on their registry account card, but for large purchases make use of a credit arrangement with the registry provider. Such a system would address the problem of previous smart-card systems whereby funds held on the card are "locked in" to the card.

20

The smart-cards used to implement the present invention may use any standard interface. There is an International Standard (ISO7816-3) which governs the so-called contact interface where the microchip on the smart-card interfaces with a reader by means of physical contacts between the microchip on the smart-card and the reader. There is a further International Standard (ISO14443) which governs the so-called contactless interface. In this interface, the microchip on the smart-card and the reader have no physical connection,

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all communication between the reader and the smart-card, including supply of power to the smart-card, is performed using radio transmissions. It is also possible to implement the invention using a smart-card capable of using both of the above interface types.

As described above, the smart-cards 3,23,33 may be implemented using multi-programmable technologies such as Sun Microsystems Inc's JavaCard™ technology. It is therefore possible for a person or organisation already possessing a smart-card conforming to such a multi-programmable technology to have software to enable the smart-card as a smart-card 3,23,33 according to any of the above embodiments loaded onto their smart-card. Such software loading could be performed by an authority such as a registry operator, or the software could be transmitted to the smart-card owner via the internet or similar connection, or on a storage medium such as a floppy disk or CD-ROM for the smart-card owner to use to load the software onto the smart-card themselves.

Although it has been described above that the session IDs should be generated using a time stamp, a random number, a terminal ID and a smart-card ID, it is not necessary that the session ID be generated in this manner for the successful operation of the embodiments. As one skilled in the art would appreciate, any method of generating a new, unique session ID for each transaction that a particular smart-card 3,23,33 is involved in, could be used. This method could involve using less than all of

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the above parts of the session ID described in the above embodiment, or other values such as account holder identifiers or a transaction counter could be used.

CLAIMS:

1. An electronic transaction payment system comprising:
a vendor terminal associated with a vendor who
5 provides goods or services to a purchaser;
a vendor smart-card;
a vendor smart-card reader for transmitting data to
and receiving data from said vendor smart-card;
a purchaser smart-card; and
10 a purchaser smart-card reader for transmitting data
to and receiving data from said purchaser smart-card;
wherein said vendor terminal comprises: (i) means
for processing requests for vendor goods or services from
said purchaser; (ii) means for generating cost data
15 identifying the cost of requested goods or services;
(iii) means for interfacing with said vendor smart-card
reader; (iv) means for interfacing with said purchaser
smart-card reader; and (v) means for transmitting the
cost data to said purchaser smart-card via said purchaser
20 smart-card reader interface;
wherein said purchaser smart-card comprises: (i)
means for receiving said cost data from said vendor
terminal; (ii) means for encrypting payment data to be
transmitted to said vendor smart-card; and (iii) means
25 for outputting the encrypted payment data for
transmission to said vendor smart-card; and
wherein said vendor smart-card comprises: (i) means
for receiving said encrypted payment data from said
purchaser smart-card; and (ii) means for decrypting said
30 encrypted payment data received from said purchaser

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smart-card to obtain payment for the requested goods or services.

5 2. A system according to claim 1, wherein said purchaser smart-card further comprises means for digitally signing said payment data using a purchaser digital signature and wherein said vendor smart-card further comprises means for reading the digital signature applied to the payment data to establish the origin of
10 the payment.

15 3. A system according to claim 2, wherein said vendor smart-card further comprises means for generating receipt data describing the goods or services requested and the payment obtained from said payment data; means for digitally signing said receipt data using a vendor digital signature; and means for outputting the signed receipt data for transmission to said purchaser smart-card; and wherein said purchaser smart-card further
20 comprises means for receiving said signed receipt data and means for reading the vendor digital signature applied to the receipt data to establish the origin of the receipt.

25 4. A system according to claim 3, wherein at least one of each said digital signatures is generated using a time stamp.

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5. A system according to claim 3 or 4, wherein at least one of each said digital signatures is generated using a random number.

5 6. A system according to any of claims 3 to 5, wherein at least one of each said digital signatures is generated using a smart-card identifier.

10 7. A system according to any of claims 3 to 6, wherein at least one of said digital signatures is generated using a terminal identifier.

15 8. A system according to any of claims 3 to 7, wherein each of said digital signatures is different.

9. A system according to any of claims 3 to 7, wherein said digital signatures are the same.

20 10. An electronic transaction payment system according to any of claims 2 to 9, wherein

said means for digitally signing said payment data comprises said encrypting means; and

said means for reading said purchaser digital signature comprises said decrypting means.

25 11. A system according to any preceding claim, wherein:
said vendor terminal further comprises means for receiving a request for data describing the vendor; and means for outputting said request to said vendor smart-card; and
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said vendor smart-card further comprises means for receiving said request for data describing the vendor; means for generating data describing the vendor in accordance with said request; and means for outputting
5 the data describing the vendor to said vendor terminal.

12. A system according to claim 11, wherein said purchaser smart-card further comprises means for receiving said data describing the vendor from said
10 vendor smart-card; and means for determining whether said data describing the vendor conforms to a predetermined condition to determine whether said payment data should be generated for transmission to said vendor smart-card.

13. A system according to any preceding claim,
15 comprising:

a registry;

a registry smart-card; and

a registry smart-card reader for transmitting data
20 to and receiving data from said registry smart-card;

wherein said registry comprises: means for interfacing with said registry smart-card reader; and means for interfacing with said vendor terminal;

wherein said purchaser smart-card further comprises
25 means for outputting a request for data describing the vendor for transmission to said registry smart-card;

wherein said registry smart-card comprises: means for receiving said request for data describing the vendor from said purchaser smart-card; means for generating data
30 describing the vendor in accordance with said request;

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and means for outputting the data describing the vendor for transmission to said purchaser smart-card; and

said purchaser smart-card further comprises; means for receiving said data describing the vendor from said registry smart-card; and means for determining whether said data describing the vendor conforms to a predetermined condition to determine whether said payment data should be generated for transmission to said vendor smart-card.

14. A system according to any preceding claim wherein: said vendor terminal further comprises means for receiving a request for data describing the purchaser; and means for outputting said request for transmission to said purchaser smart-card; and

said purchaser smart-card further comprises: means for receiving said request for data describing the purchaser; means for generating data describing the purchaser in accordance with said request; and means for outputting the data describing the purchaser for transmission to said vendor terminal.

15. A system according to claim 14, wherein said vendor smart-card further comprises: means for receiving said data describing the purchaser from said vendor smart-card; and means for determining whether said data describing the purchaser conforms to a predetermined condition to determine whether said goods or services are to be provided to said purchaser or whether said payment data is to be accepted.

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16. A system according to any preceding claim, comprising:

a registry;

a registry smart-card; and

5 a registry smart-card reader for transmitting data to and receiving data from said registry smart-card;

wherein said registry comprises means for interfacing with said registry smart-card reader; and means for interfacing with said vendor terminal;

10 wherein said vendor smart-card further comprises means for outputting a request for data describing the purchaser for transmission to said registry smart-card;

wherein said registry smart-card further comprises: means for receiving said request for data describing the purchaser from said vendor smart-card; means for
15 generating data describing the purchaser in accordance with said request; and means for outputting the data describing the purchaser for transmission to said vendor smart-card; and

20 wherein said vendor smart-card further comprises: means for receiving said data describing the purchaser from said registry smart-card; and means for determining whether said data describing the purchaser conforms to the predetermined condition to determine whether said
25 goods or services are to be provided to said purchaser or whether said payment data is to be accepted.

17. A system according to any preceding claim, wherein said vendor smart-card further comprises a memory for
30 storing an asymmetric encryption key pair comprising a

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5 vendor private key and a vendor public key; and means for
outputting said vendor public key for transmission to
said purchaser smart-card, wherein said purchaser smart-
card further comprises means for receiving said vendor
public key; and is operable to encrypt said payment data
using said vendor public key; and

wherein said means for decrypting said payment data
in said vendor smart-card is operable to decrypt the
payment data using the vendor private key.

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18. A system according to claim 17 wherein said
asymmetric encryption key pair are generated using an RSA
algorithm.

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19. A system according to claim 17, wherein said
asymmetric encryption key pair are generated using an
elliptic curve algorithm.

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20. A system according to any preceding claim, wherein
said purchaser smart-card reader interface comprises
means for communication via a computer network.

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21. A system according to any preceding claim wherein
said purchaser smart-card reader interface comprises
means for communication via the Internet.

22. A system according to any preceding claim
comprising:

a registry;

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a purchaser registry smart-card associated with the purchaser; and

a registry smart-card reader for transmitting data to and receiving data from said purchaser registry smart-card;

wherein said registry comprises means for interfacing with said registry smart-card reader; and means for interfacing with said vendor terminal;

wherein said purchaser smart-card further comprises: means for generating instruction data, for instructing said purchaser registry smart-card to make a payment, to be transmitted to said vendor smart-card; and means for outputting the instruction data for transmission to said purchaser registry smart-card;

wherein said purchaser registry smart-card further comprises means for receiving said instruction data from said purchaser smart-card; means for generating payment data to be transmitted to said vendor smart-card; means for encrypting said payment data; and means for outputting the encrypted payment data for transmission to said vendor smart-card; and wherein said vendor smart-card further comprises: means for receiving said encrypted payment data from said purchaser registry smart-card.

23. A system according to any preceding claim, further comprising:

a registry;

a vendor registry smart-card; and

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a registry smart-card reader for transmitting data to and receiving data from said vendor registry smart-card;

5 wherein said purchaser smart-card further comprises means for outputting said encrypted payment data for transmission to said vendor registry smart-card;

10 wherein said vendor registry smart-card comprises: means for receiving said encrypted payment data from said purchaser smart-card; means for decrypting said encrypted payment data received from said purchaser smart-card to obtain payment for the request goods or services; means for generating acknowledgement data describing the obtained payment; and means for outputting said acknowledgement data for transmission to said vendor smart-card; and

15 wherein said vendor smart-card further comprises means for receiving said acknowledgement data from said vendor registry smart-card.

20 24. A system according to any preceding claim, further comprising a purchaser terminal associated with the purchaser, the purchaser terminal comprising: (i) means for generating a request for vendor goods or services from said purchaser; (ii) means for interfacing with said purchaser smart-card reader; (iii) means for interfacing with said vendor terminal; and (iv) means for transmitting said purchaser requests to said vendor terminal via said purchaser smart-card.

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25. A system according to claim 24, wherein data transmitted between said purchaser terminal and said vendor terminal is encrypted before transmission by the respective smart-cards.

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26. An electronic transaction payment system comprising:
a vendor terminal associated with a vendor who provides goods or services to a purchaser;

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a vendor smart-card;
a vendor smart-card reader for transmitting data to and receiving data from said vendor smart-card;
a purchaser smart-card; and

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a purchaser smart-card reader for transmitting data to and receiving data from said purchaser smart-card;

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wherein said vendor terminal comprises: (i) means for processing requests for vendor goods or services from said purchaser; (ii) means for generating cost data identifying the cost of requested goods or services; (iii) means for interfacing with said vendor smart-card reader; (iv) means for interfacing with said purchaser smart-card reader; and (v) means for transmitting the cost data to said purchaser smart-card via said purchaser smart-card interface;

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wherein said purchaser smart-card comprises; (i) means for receiving said cost data from said vendor terminal; (ii) means for digitally signing payment data to be transmitted to said vendor smart-card; (iii) means for outputting the signed payment data for transmission to said vendor smart-card;

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wherein said vendor smart-card comprises; (i) means for receiving said signed payment data from said purchaser smart-card to obtain payment for the requested goods or services; (ii) means for reading the digital signature applied to the payment data to establish the origin of the payment; (iii) means for generating receipt data describing the goods or services and the payment obtained from said payment data; (iv) means for digitally signing said receipt data; and (v) means for outputting the signed receipt data for transmission to said purchaser smart-card,

wherein said purchaser smart-card further comprises: (iv) means for receiving said signed receipt data; and (v) means for reading the digital signature applied to the receipt data to establish the origin of the receipt.

27. An electronic transaction payment system comprising:
a vendor terminal associated with a vendor who provides goods or services to a purchaser;

a vendor smart-card;
a vendor smart-card reader for transmitting data to and receiving data from said vendor smart-card;
a purchaser smart-card; and
a purchaser smart-card reader for transmitting data to and receiving data from said purchaser smart-card;

wherein said vendor terminal comprises: (i) means for processing requests for vendor goods or services from said purchaser; (ii) means for generating cost data identifying the cost of requested goods or services;
(iii) means for interfacing with said vendor smart-card

reader; (iv) means for interfacing with said purchaser smart-card; and (v) means for transmitting the cost data to said purchaser smart-card via said purchaser smart-card reader interface;

5 wherein said purchaser smart-card comprises: (i) means for receiving said cost data from said vendor terminal; (ii) means for generating a request for data describing the vendor; and (iii) means for outputting the request for data describing the vendor for transmission
10 to said vendor smart-card;

 wherein said vendor smart-card comprises: (i) means for receiving said request for data describing the vendor from said purchaser smart-card; (ii) means for generating data describing the vendor in accordance with said
15 request; and (iii) means for outputting the data describing the vendor for transmission to said purchaser smart-card;

 wherein said purchaser smart-card further comprises:
 (iv) means for receiving said data describing the vendor
20 from said vendor smart-card; (v) means for determining whether said data describing the vendor conforms to a predetermined condition; (vi) means for, if said data describing the vendor conforms to said predetermined condition, generating payment data to be transmitted to
25 said vendor smart-card; and (vii) means for outputting the payment data for transmission to said vendor smart-card; and

 wherein said vendor smart-card further comprises:
 (iv) means for receiving said payment data from said

purchaser smart-card to obtain payment for requested goods or services.

28. An electronic transaction payment system comprising:

5 a vendor terminal associated with a vendor who provides goods or services to a purchaser;

a vendor smart-card;

a vendor smart-card reader for transmitting data to and receiving data from said vendor smart-card;

10 a purchaser smart-card; and

a purchaser smart-card reader for transmitting data to and receiving data from said purchaser smart-card;

wherein said vendor terminal comprises: (i) means for processing requests for vendor goods or services from said purchaser; (ii) means for generating cost data identifying the cost of requested goods or services; (iii) means for interfacing with said vendor smart-card reader; (iv) means for interfacing with said purchaser smart-card reader; and (v) means for transmitting the cost data to said purchaser smart-card via said purchaser smart-card reader interface;

15 wherein said purchaser smart-card comprises: (i) means for receiving said cost data from said vendor terminal;

25 wherein said vendor smart-card comprises: (i) means for generating a request for data describing the purchaser; and (ii) means for outputting the request for data describing the purchaser for transmission to said purchaser smart-card;

wherein said purchaser smart-card further comprises:

(ii) means for receiving said request for data describing the purchaser from said vendor smart-card; (iii) means for generating data describing the purchaser in accordance with said request; and (iv) means for outputting the data describing the purchaser for transmission to said vendor smart-card;

wherein said vendor smart-card further comprises:

(iii) means for receiving said data describing the purchaser from said purchaser smart-card; (iv) means for determining whether said data describing the purchaser conforms to a predetermined condition; (v) means for, if said data describing the purchaser conforms to said predetermined condition, generating acceptance data to be transmitted to said purchaser smart-card; and (vi) means for outputting the acceptance data for transmission to the purchaser smart-card; and

wherein said purchaser smart-card further comprises:

(v) means for receiving said acceptance data from said vendor smart-card; (vi) means for generating payment data to be transmitted to said vendor smart-card; and (vii) means for outputting the payment data for transmission to said vendor smart-card; and

wherein said vendor smart-card further comprises:

(viii) means for receiving said payment data from said purchaser smart-card to obtain payment for the requested goods or services.

29. An electronic transaction payment system comprising:
a vendor terminal associated with a vendor who
provides goods or services to a purchaser;

a vendor smart-card;

5 a vendor smart-card reader for transmitting data to
and receiving data from said vendor smart-card;

a purchaser smart-card; and

a purchaser smart-card reader for transmitting data
to and receiving data from said purchaser smart-card;

10 wherein said vendor terminal comprises: (i) means
for processing requests for vendor goods or services from
said purchaser; (ii) means for generating cost data
identifying the cost of requested goods or services;
(iii) means for interfacing with said vendor smart-card
15 reader; (iv) means for interfacing with said purchaser
smart-card; and (v) means for transmitting the cost data
to said purchaser smart-card via said purchaser smart-
card reader interface;

20 wherein said purchaser smart-card comprises: (i)
means for receiving said cost data from said vendor
terminal; (ii) means for generating a request for data
describing the vendor; and (iii) means for outputting the
request for data describing the vendor for transmission
to said vendor smart-card;

25 wherein said vendor smart-card comprises: (i) means
for receiving said request for data describing the vendor
from said purchaser smart-card; (ii) means for receiving
data describing the vendor in accordance with said
request; and (iii) means for outputting the data

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describing the vendor for transmission to said purchaser smart-card;

wherein said purchaser smart-card further comprises:

(iv) means for receiving said data describing the vendor
5 from said vendor smart-card; (v) means for outputting
said data describing said vendor to the purchaser; (vi)
means for receiving an indication whether or not said
data describing the vendor is acceptable to the
purchaser; and (vii) means for, if said data describing
10 the vendor is acceptable, causing payment data to be
transmitted to said vendor smart-card; and

wherein said vendor smart-card further comprises:

(iv) means for receiving said payment data to obtain
payment for the requested goods or services.

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30. An electronic transaction payment system comprising:

a vendor terminal associated with a vendor who
provides goods or services to a purchaser;

a vendor smart-card;

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a vendor smart-card reader for transmitting data to
and receiving data from said vendor smart-card;

a purchaser smart-card; and

a purchaser smart-card reader for transmitting data
to and receiving data from said purchaser smart-card;

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wherein said vendor terminal comprises: (i) means
for processing requests for vendor goods or services from
said purchaser; (ii) means for generating cost data
identifying the cost of requested goods or services;
(iii) means for interfacing with said vendor smart-card
30 reader; (iv) means for interfacing with said purchaser

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smart-card reader; and (v) means for transmitting the cost data to said purchaser smart-card via said purchaser smart-card reader interface;

5 wherein said purchaser smart-card comprises: (i) means for receiving said cost data from said vendor terminal;

10 wherein said vendor smart-card comprises: (i) means for generating a request for data describing the purchaser; and (ii) means for outputting the request for data describing the purchaser for transmission to said purchaser smart-card;

15 wherein said purchaser smart-card further comprises: (ii) means for receiving said request for data describing the purchaser from said vendor smart-card; (iii) means for receiving data describing the purchaser in accordance with said request; and (iv) means for outputting the data describing the purchaser for transmission to said vendor smart-card;

20 wherein said vendor smart-card further comprises: (iii) means for receiving said data describing the purchaser from said purchaser smart-card; (iv) means for outputting said data describing the purchaser to the vendor; (v) means for receiving an indication whether or not said data describing the purchaser is acceptable to the vendor; (vi) means for, if said data describing the purchaser is acceptable, generating acceptance data to be transmitted to said purchaser smart-card; and (vii) means for outputting the acceptance data for transmission to the purchaser smart-card; and

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wherein said purchaser smart-card further comprises:

(v) means for receiving said acceptance data from said vendor smart-card; (vi) means for generating payment data to be transmitted to said vendor smart-card; and (vii) means for outputting the payment data for transmission to said vendor smart-card; and

wherein said vendor smart-card further comprises:

(viii) means for receiving said payment data from said purchaser smart-card to obtain payment for the requested goods or services.

31. A smart-card programmed to be able to function as a purchaser smart-card according to any preceding claim.

32. A smart-card programmed to be able to function as a vendor smart-card according to any of claims 1 to 29.

33. A smart-card programmed to be able to function as a registry smart-card according to any of claims 13 to 29 as dependent on at least claims 13 or 16.

34. A smart-card comprises:

means for interfacing with a card reader;

means for receiving details of a new transaction from an external terminal via said interfacing means and said card reader;

means for generating a unique session ID for the new transaction;

means for storing the generated session ID;

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means for receiving message data relating to the new transaction from the external terminal via said card reader and said interfacing means;

5 means for tagging the received message data by appending the stored session ID to the message data; and

means for outputting the tagged message data to said external terminal via said interface means and said card reader.

10 35. A smart-card according to claim 34, further comprising means for encrypting said tagged message data.

15 36. A smart-card according to claim 34 or 35, further comprising means for receiving a session ID generated by another smart-card involved in the new transaction and wherein said tagging means is operable to append the generated session ID and the received session ID to the message data.

20 37. A smart-card according to any one of claims 34 to 36, further comprising a money store for storing electronic money and wherein said tagging means is operable to tag said electronic money with said generated session ID and to output the tagged electronic money back
25 to said external terminal via said interface means in said card reader.

30 38. A smart-card according to claim 37, comprising means for storing remote account data and wherein said smart-card is operable to receive an instruction identifying

whether or not payment for a current transaction is to be made from electronic money stored on the card or from the remote account and wherein said tagging means is operable to tag said electronic money with said session ID if said instruction identifies that the payment should be made from the card and is operable to tag the stored account data if said instruction indicates that the payment is to be made from the remote account.

39. A smart-card according to any of claims 34 to 38, further comprising means for storing user validation data; means for receiving instructions to output user validation data; and wherein said tagging means is operable to tag the user validation data with the session ID prior to outputting the tagged validation data to said external terminal via said interface means and said card reader.

40. A smart-card according to any one of claims 34 to 39, further comprising a transaction log store for storing details of data transmitted during each new transaction.

41. A smart-card comprising:
means for interfacing with a card reader;
a card controller operable for receiving instructions from an external terminal via said interface means and said card reader;
means for storing electronic money;

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means for storing account data relating to a remote account;

wherein said card controller is operable to either output electronic money from said money store or to output account details from said account storing means in dependence upon instructions received from an external terminal via said interfacing means and said card reader.

42. A smart-card according to claim 41, wherein said card controller is operable to tag the electronic money or the account data with a unique identifier relating to a current transaction.

43. An electronic transaction system comprising a vendor terminal, a purchaser terminal and a third party registry for providing validation of a purchaser associated with the purchaser terminal and/or validation of a vendor associated with the vendor terminal.

44. A signal carrying processor implementable instructions for causing a smart-card to become programmed as a smart-card according to any of claims 31 to 42.

45. A storage medium storing processor implementable instructions for causing a smart-card to become programmed as a smart-card according to any of claims 31 to 42.

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46. A computer terminal programmed to function as a vendor terminal according to any of claims 1 to 30.

5 47. A computer terminal programmed to function as a purchaser terminal according to claim 24.

10 48. An electronic transaction payment characterised by the step of using an electronic transaction payment system according to any of claims 1 to 30 or a smart-card of any of claims 31 to 42.

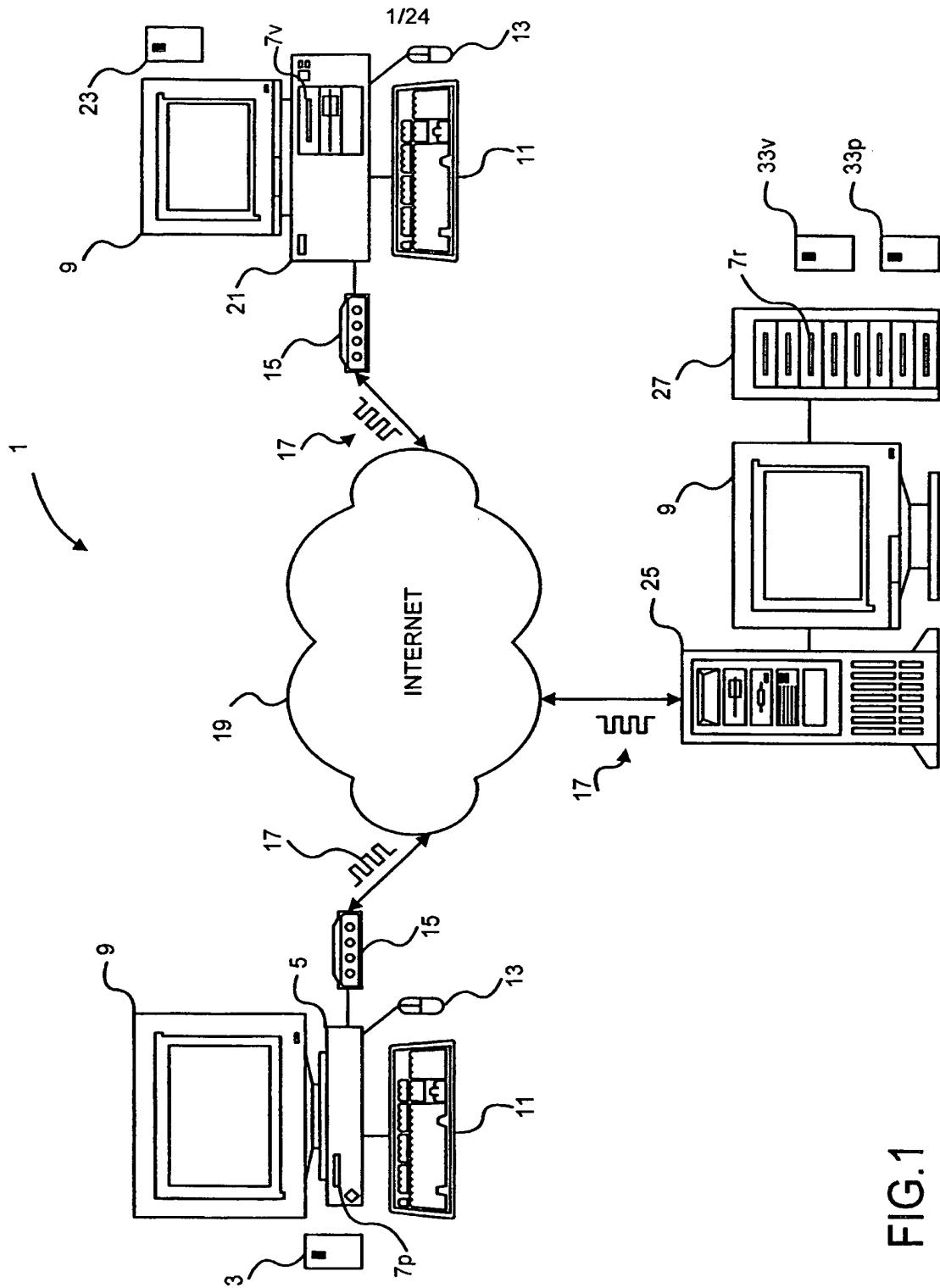


FIG.1

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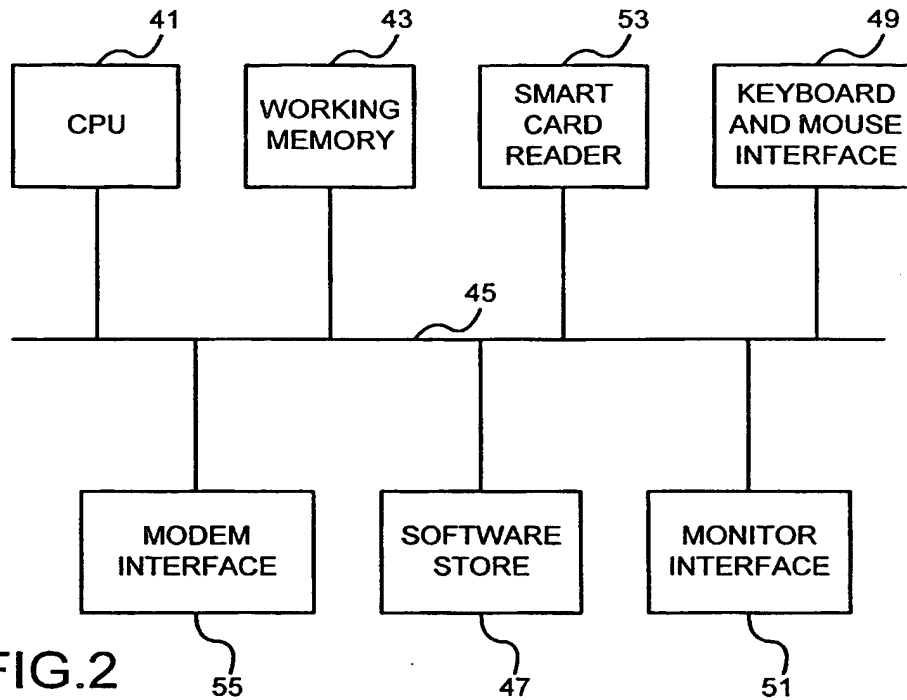


FIG. 2

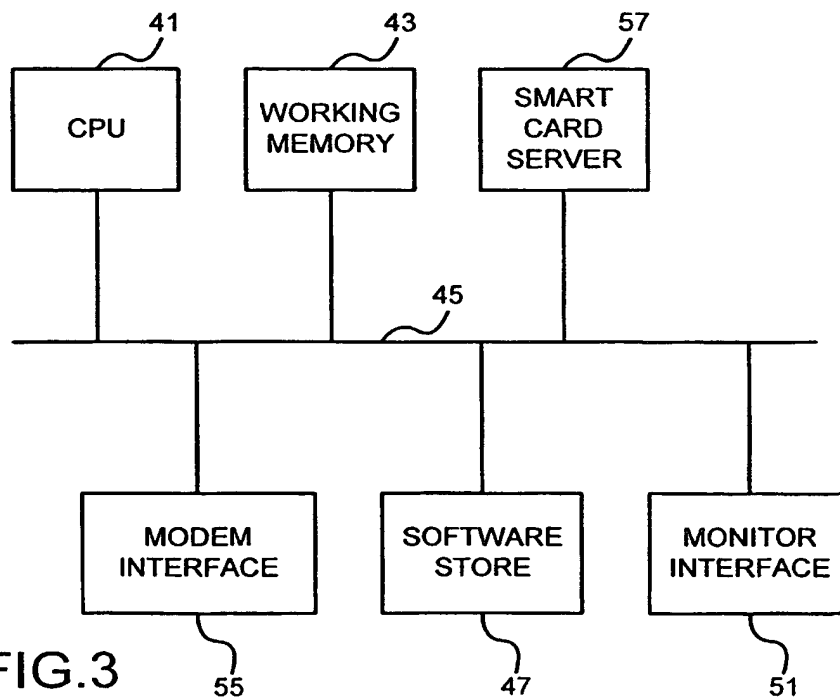


FIG. 3

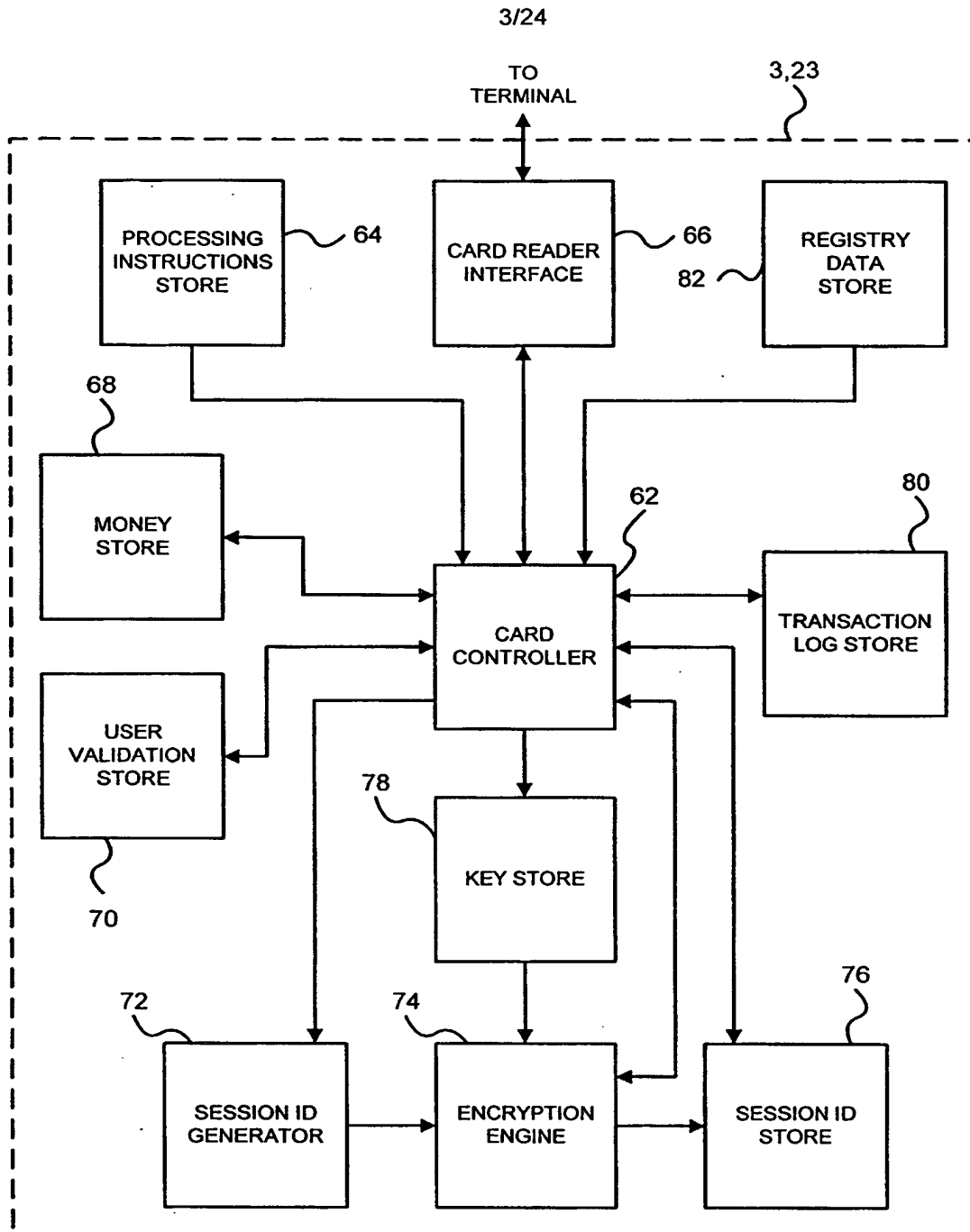
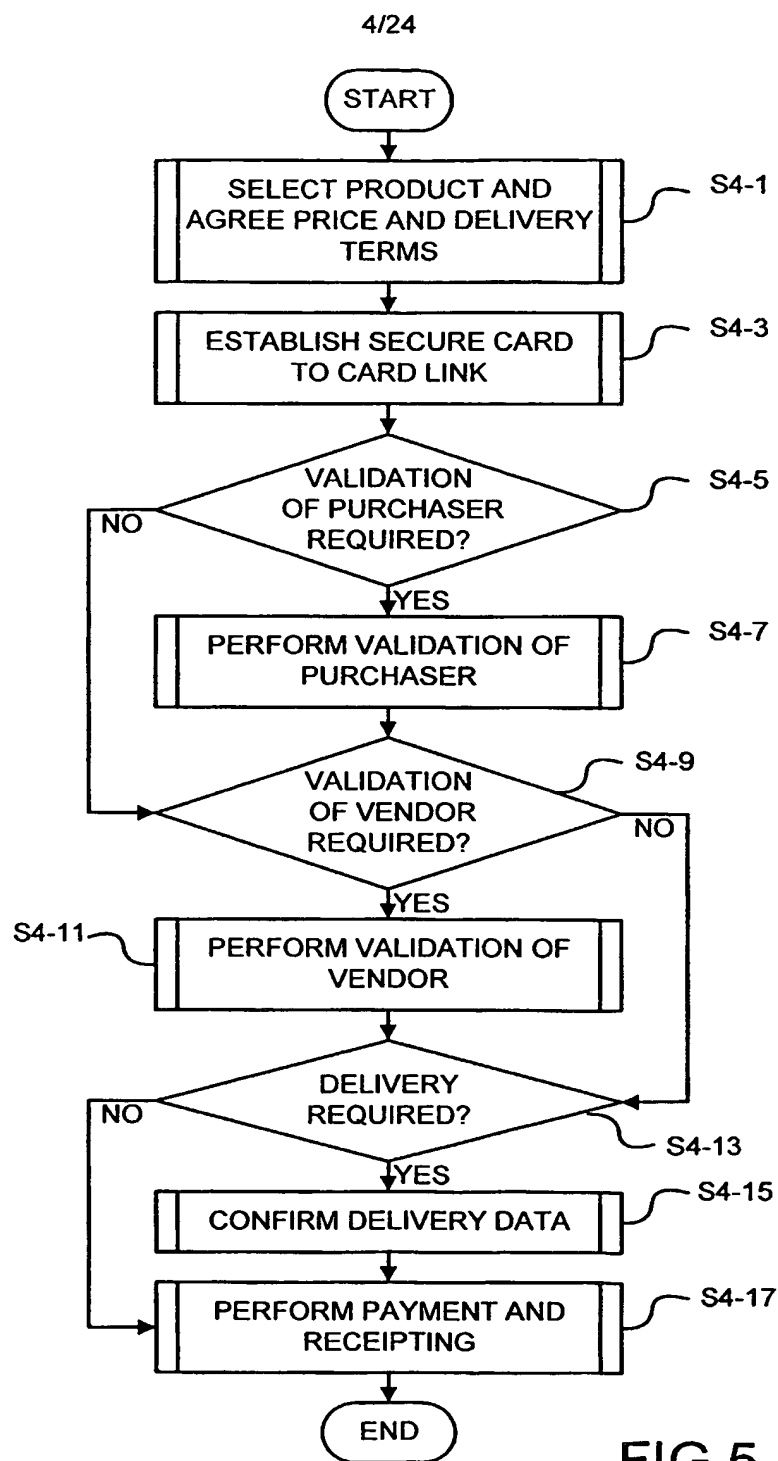


FIG.4



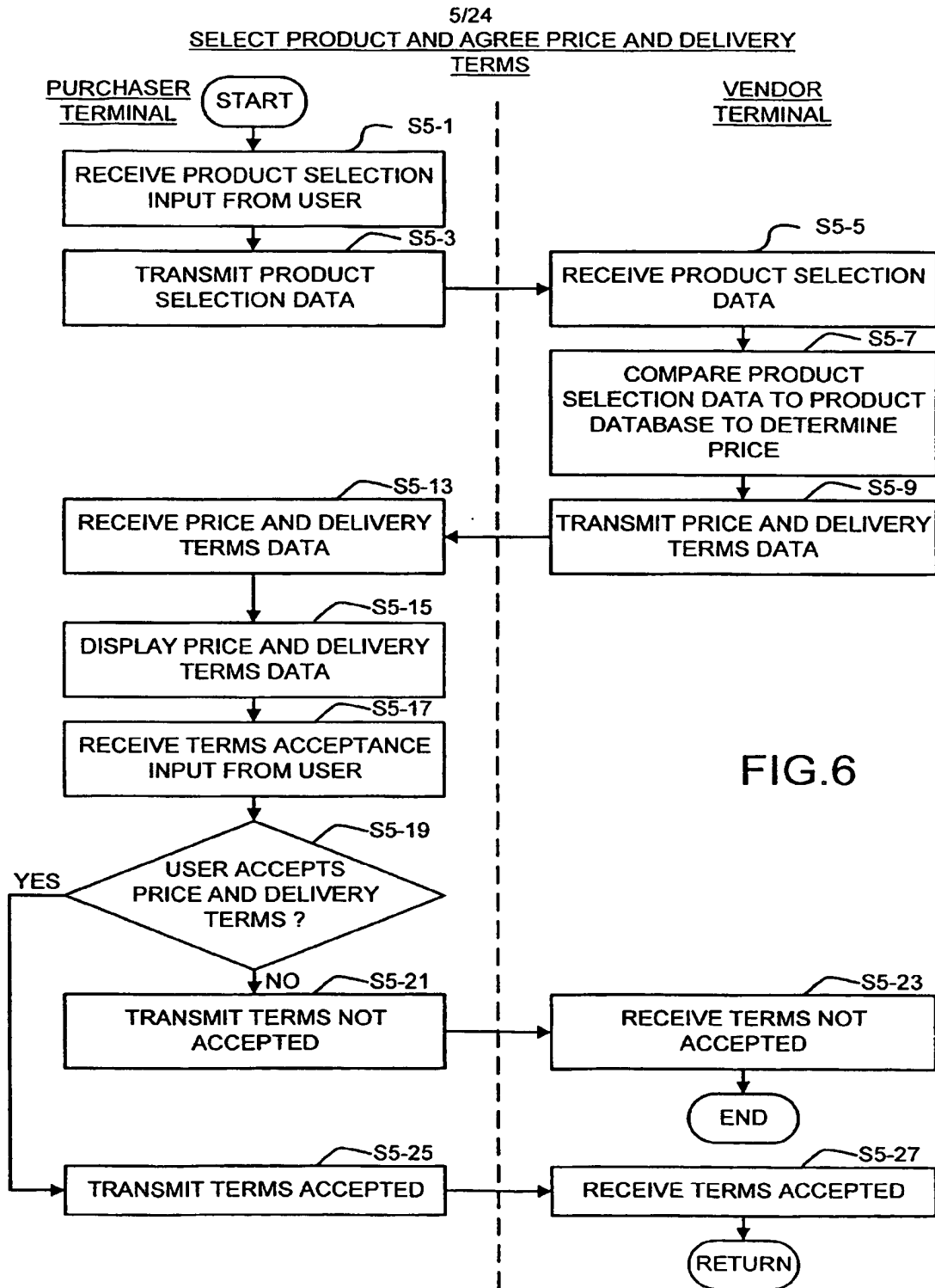


FIG.6

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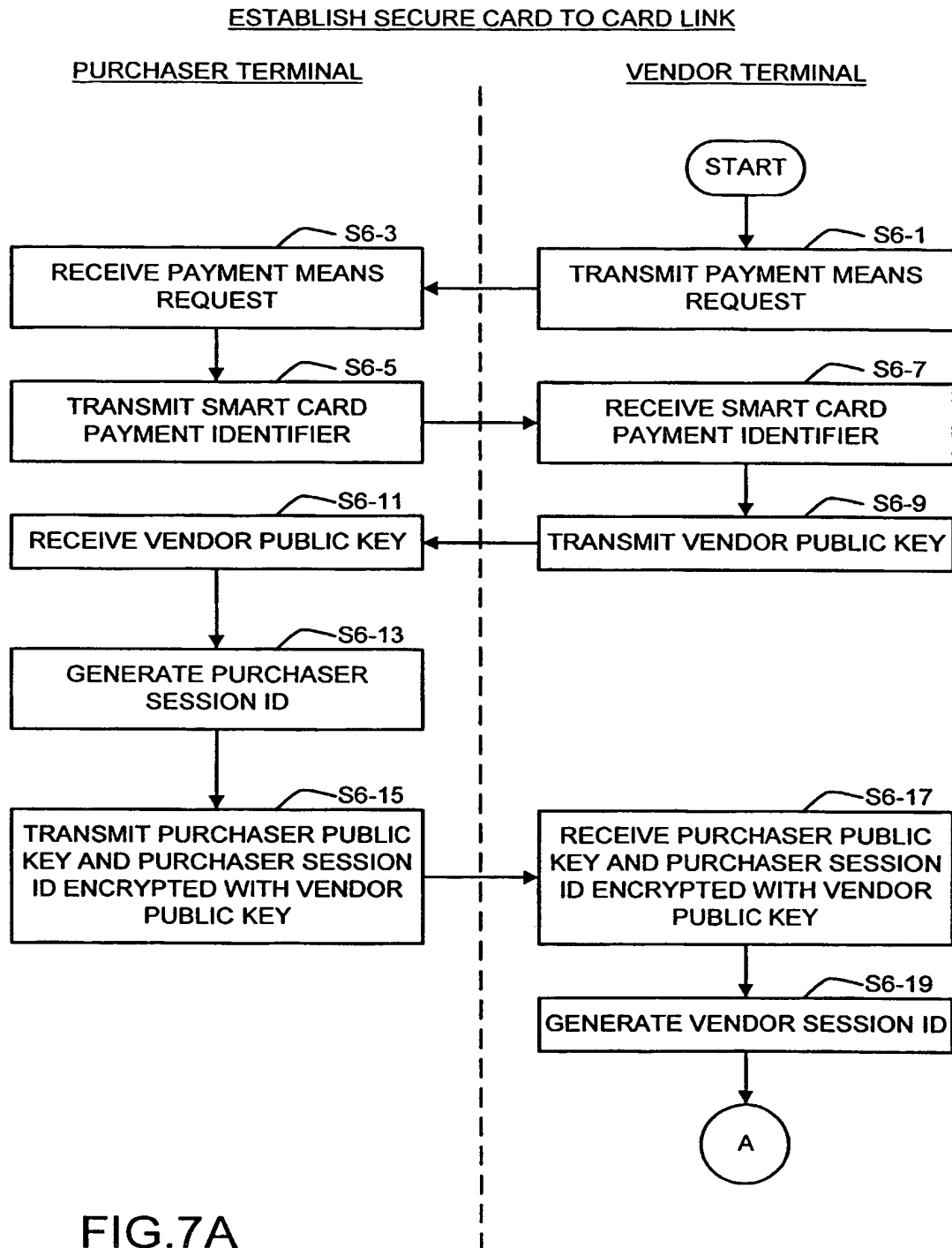


FIG.7A

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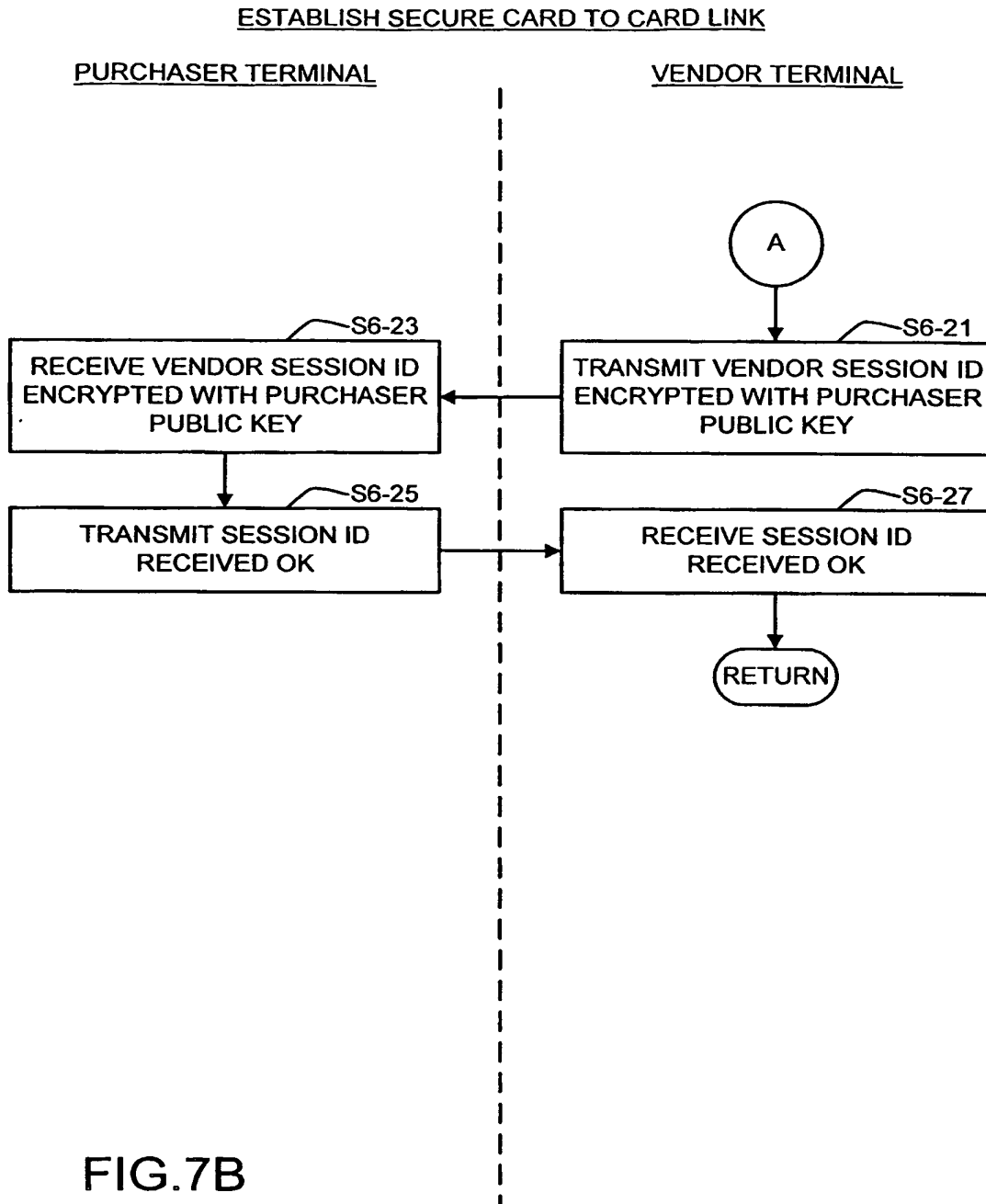
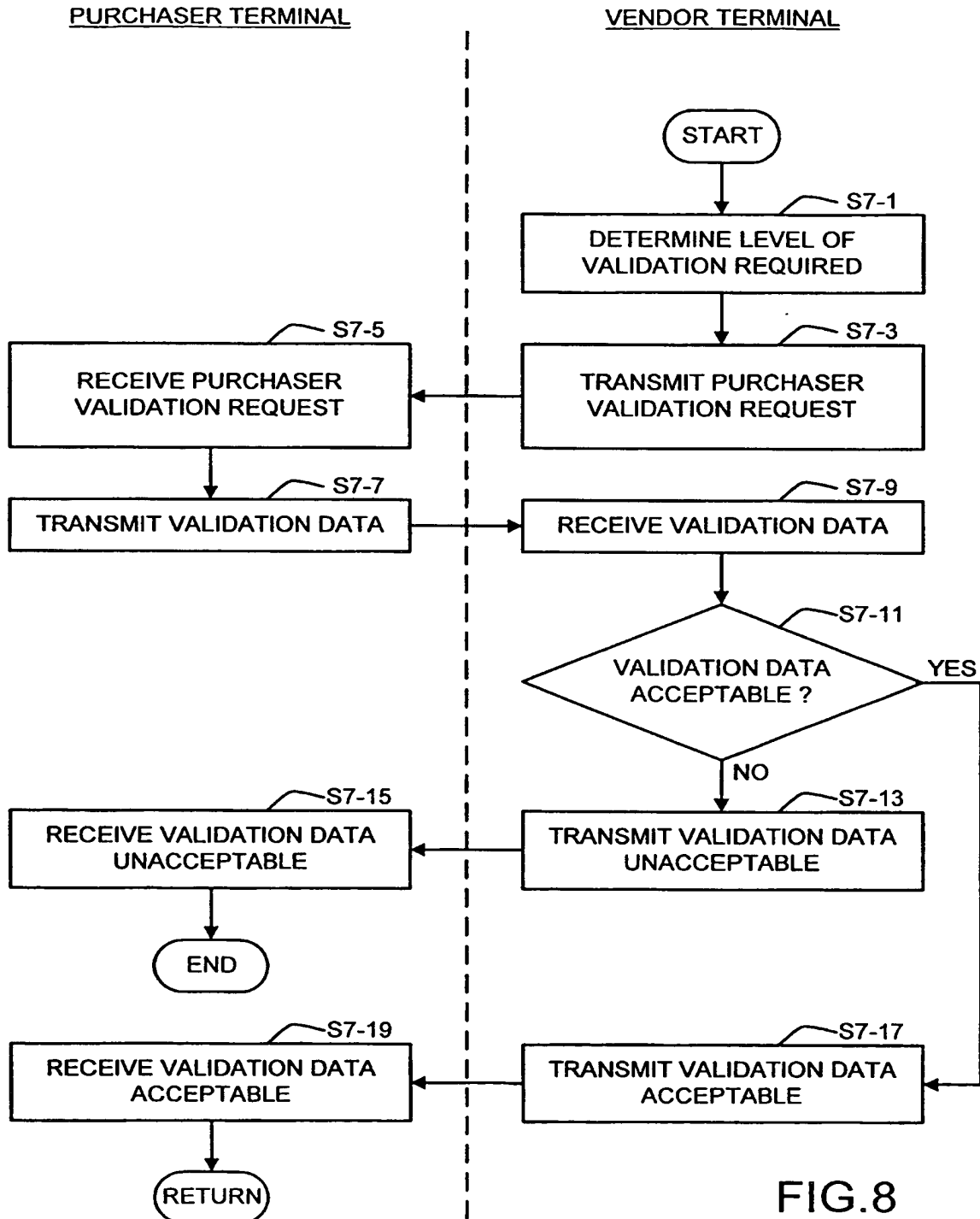


FIG.7B

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PERFORM VALIDATION OF PURCHASER

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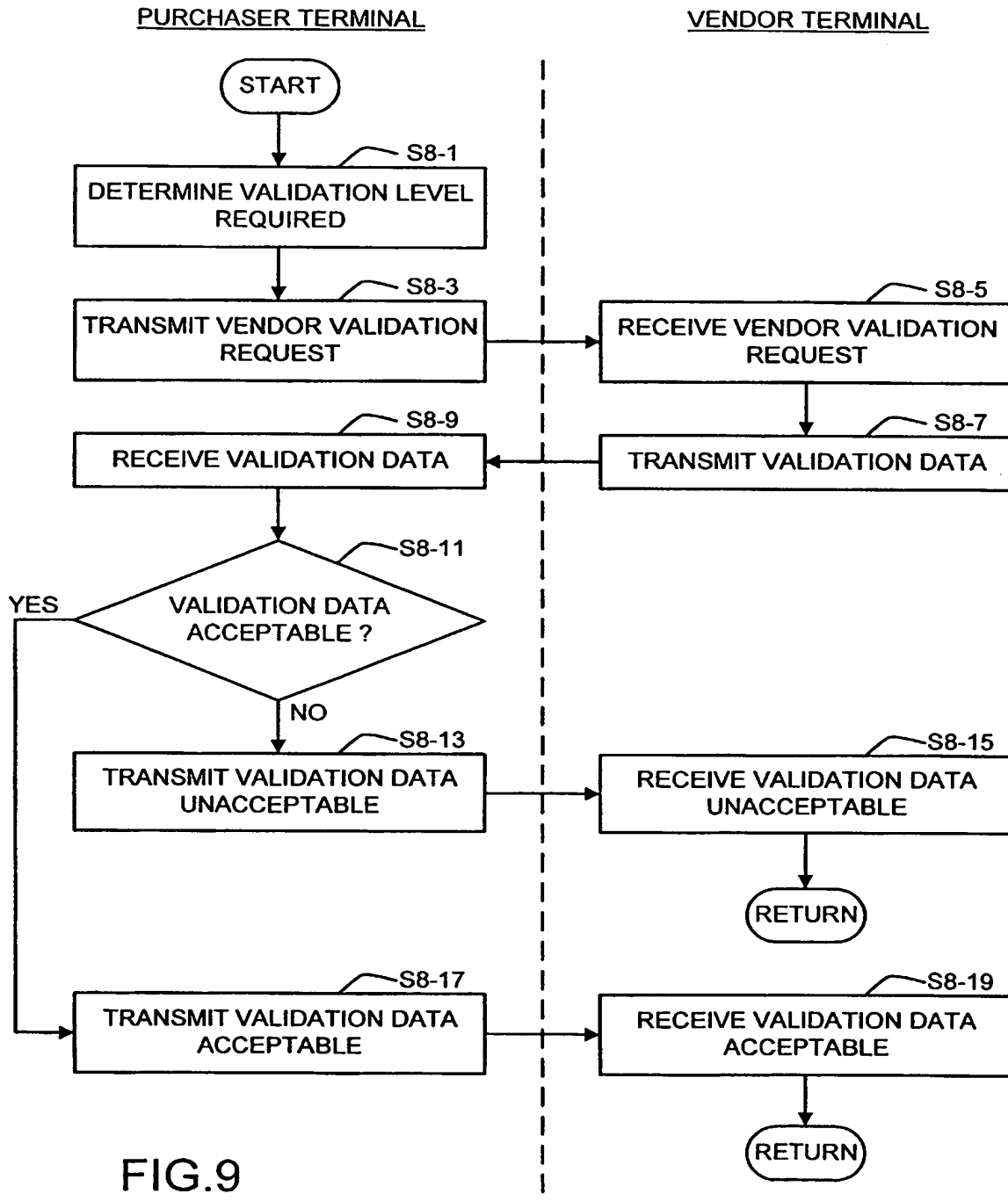
PERFORM VALIDATION OF VENDOR

FIG.9

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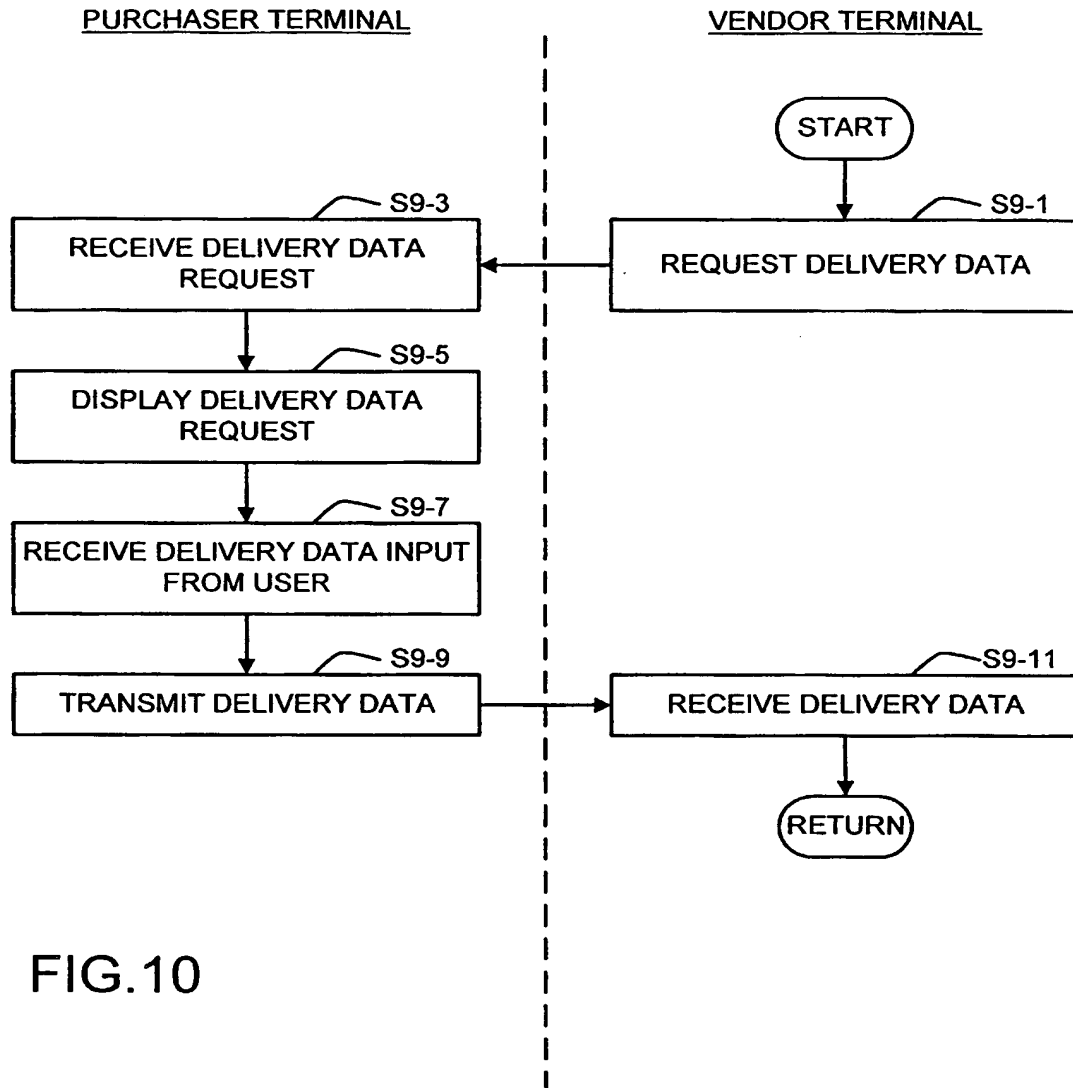
CONFIRM DELIVERY DATA

FIG.10

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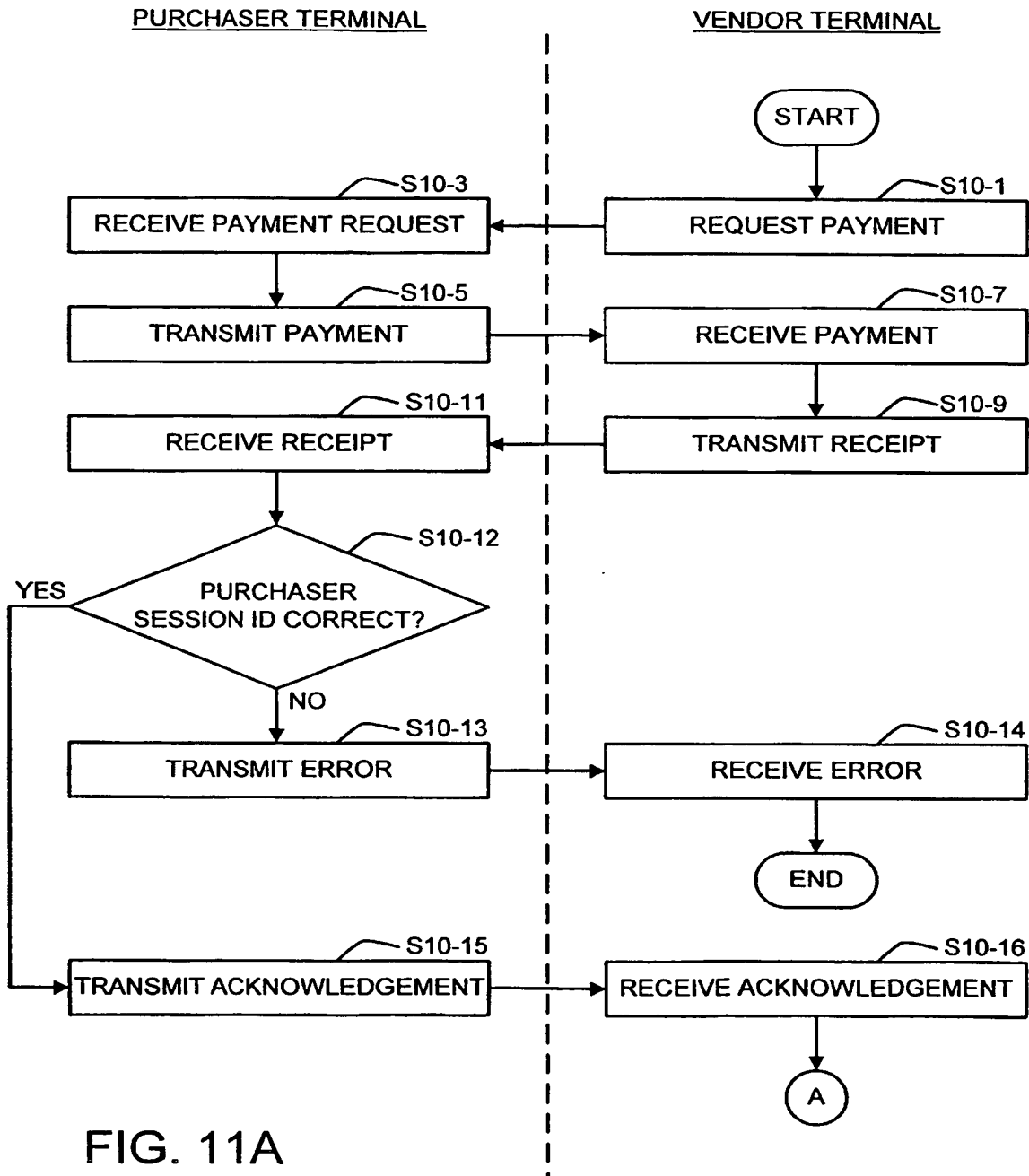
PERFORM PAYMENT AND RECEIPTING

FIG. 11A

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PERFORM PAYMENT AND RECEIPTING

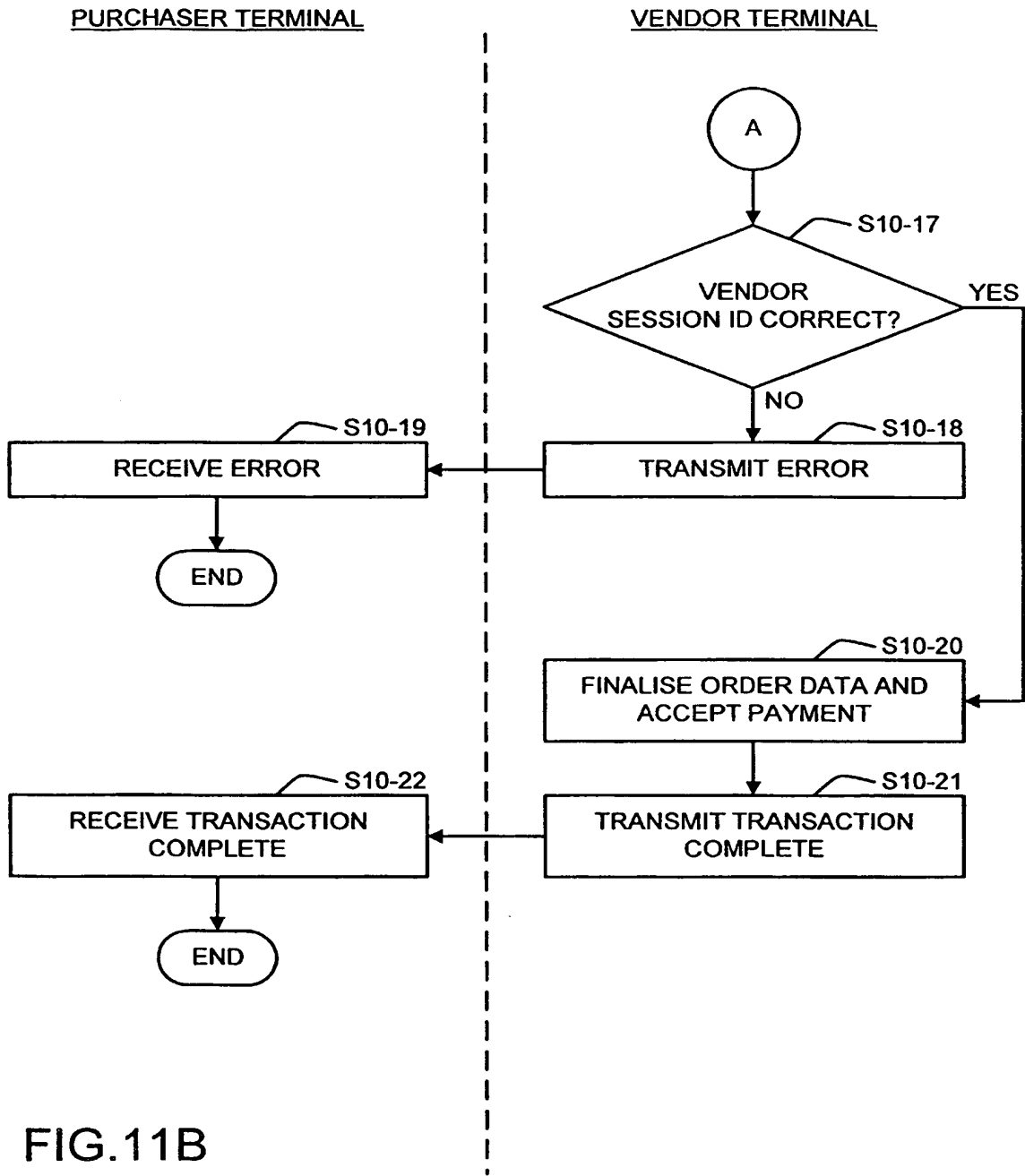
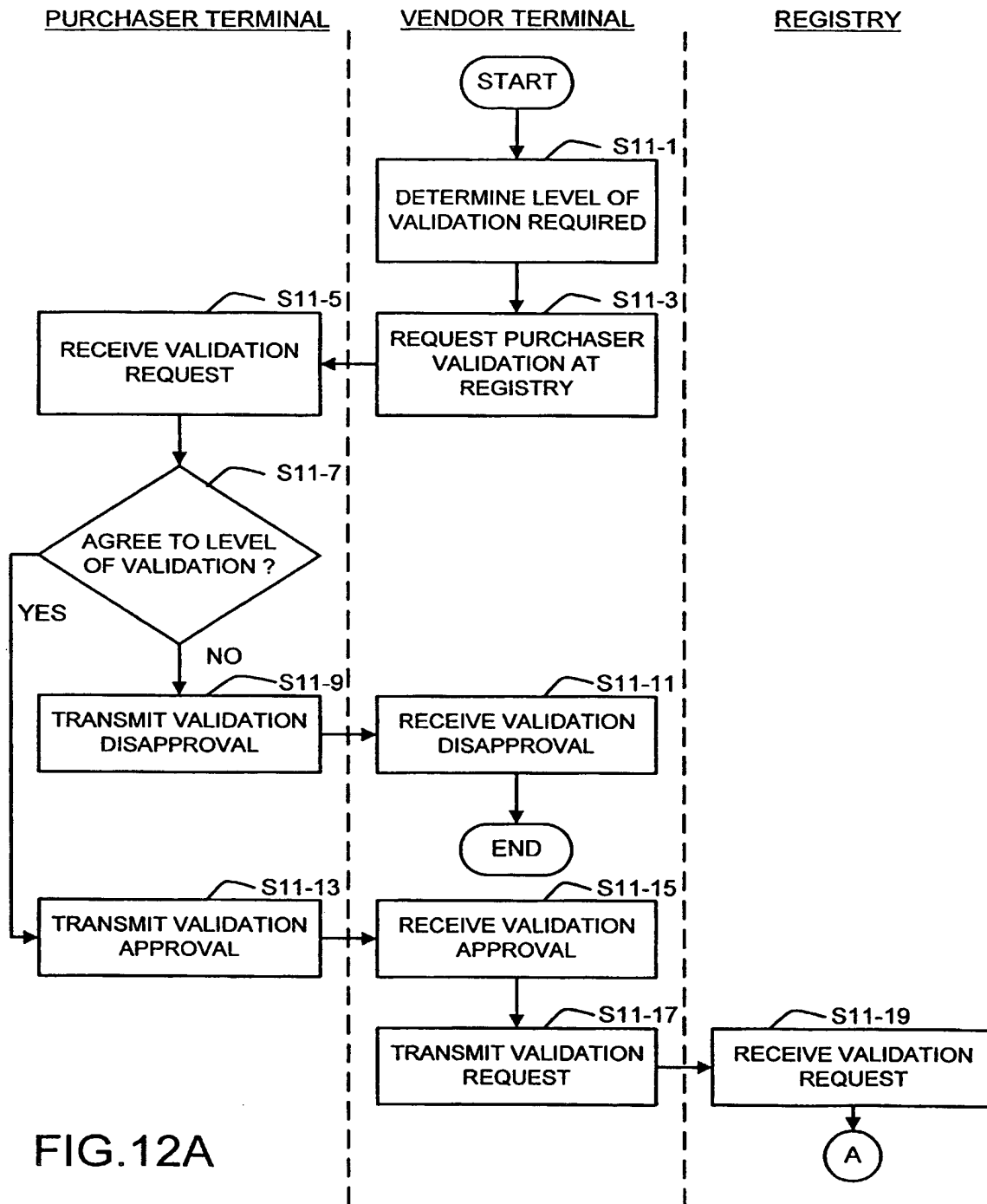


FIG.11B

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PERFORM VALIDATION OF PURCHASER AT REGISTRY WITH NOTICE

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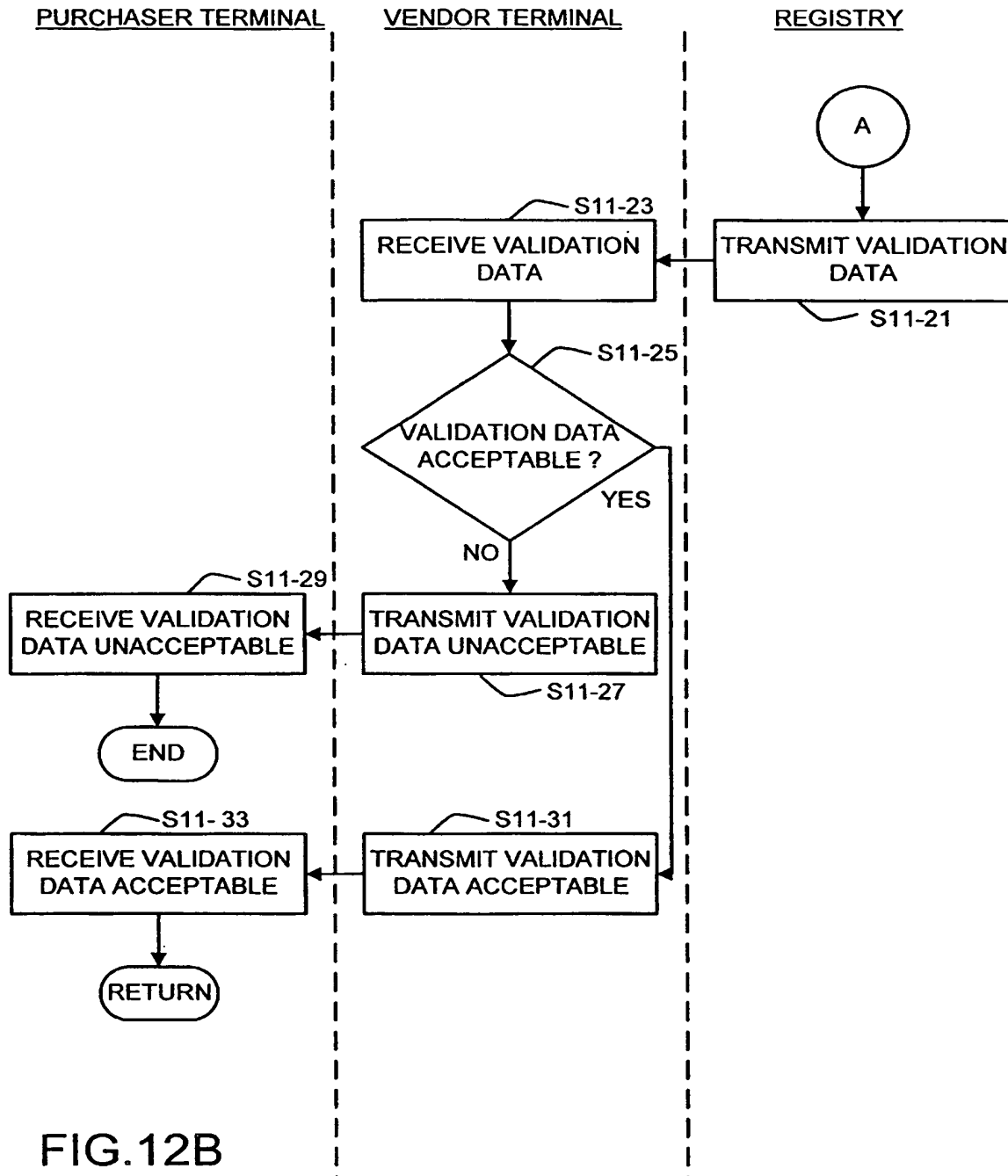
PERFORM VALIDATION OF PURCHASER AT REGISTRY WITH NOTICE

FIG.12B

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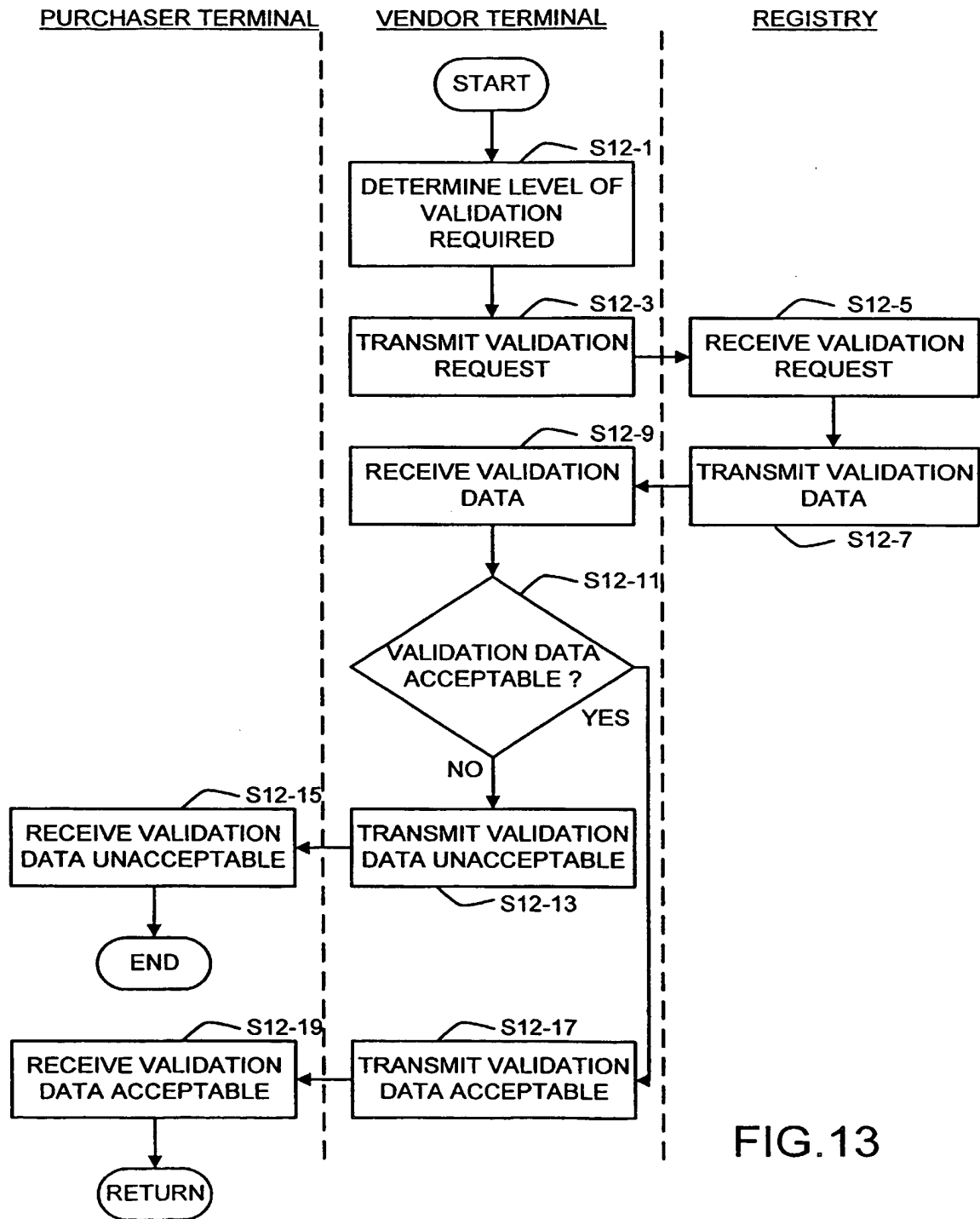
PERFORM VALIDATION OF PURCHASER AT REGISTRY WITHOUT NOTICE

FIG.13

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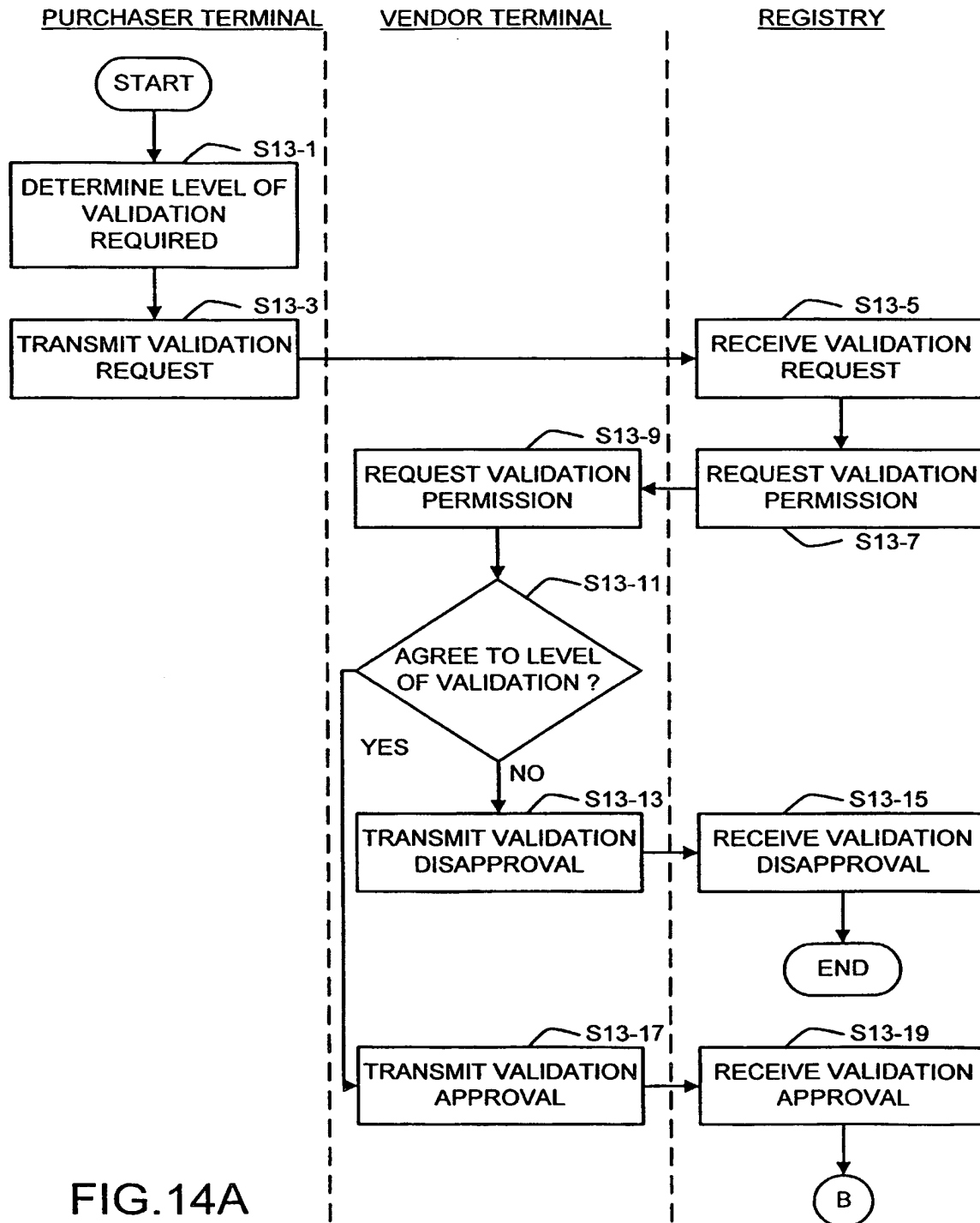
PERFORM VALIDATION OF VENDOR AT REGISTRY WITH NOTICE

FIG.14A

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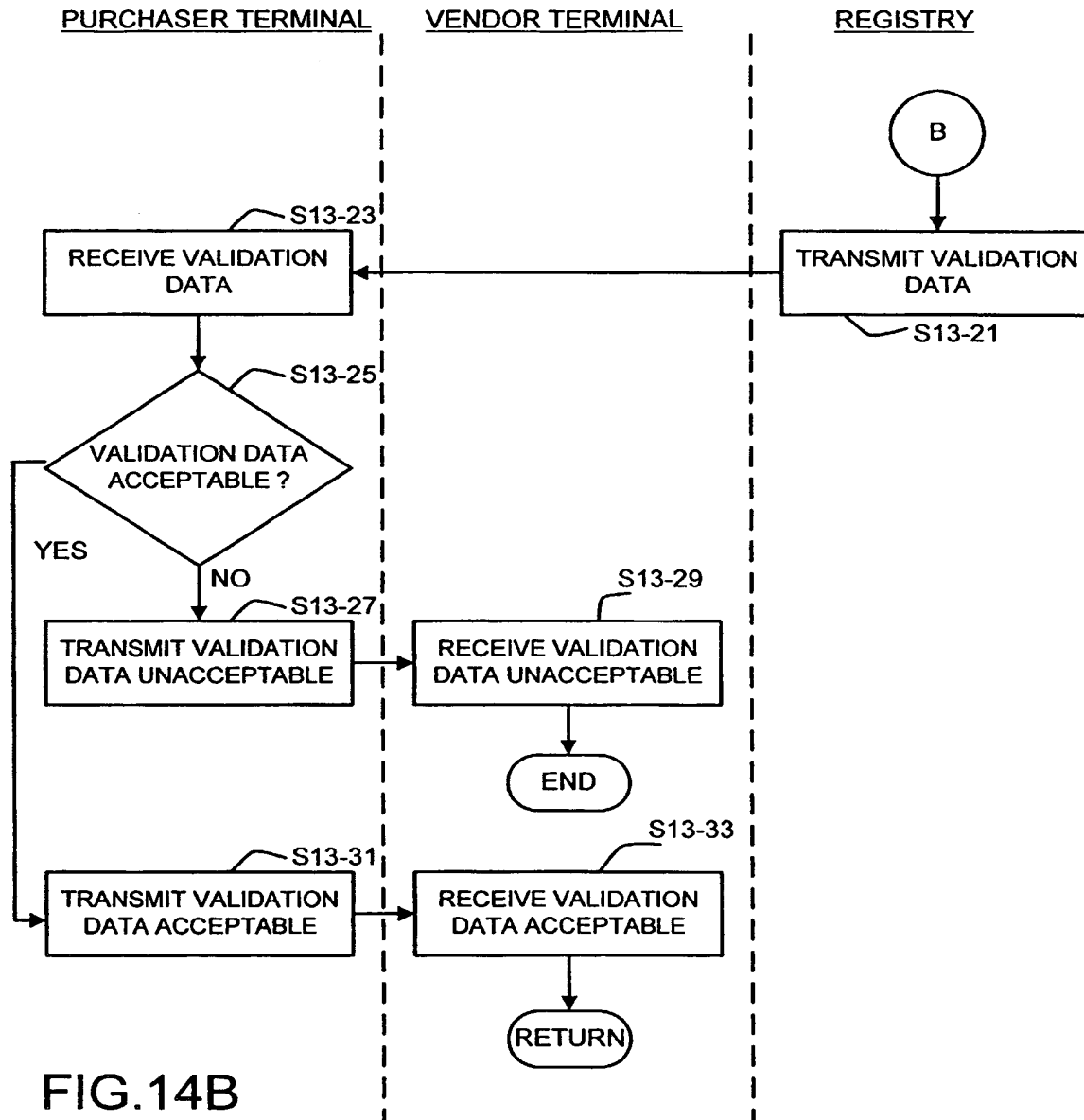
PERFORM VALIDATION OF VENDOR AT REGISTRY WITH NOTICE

FIG.14B

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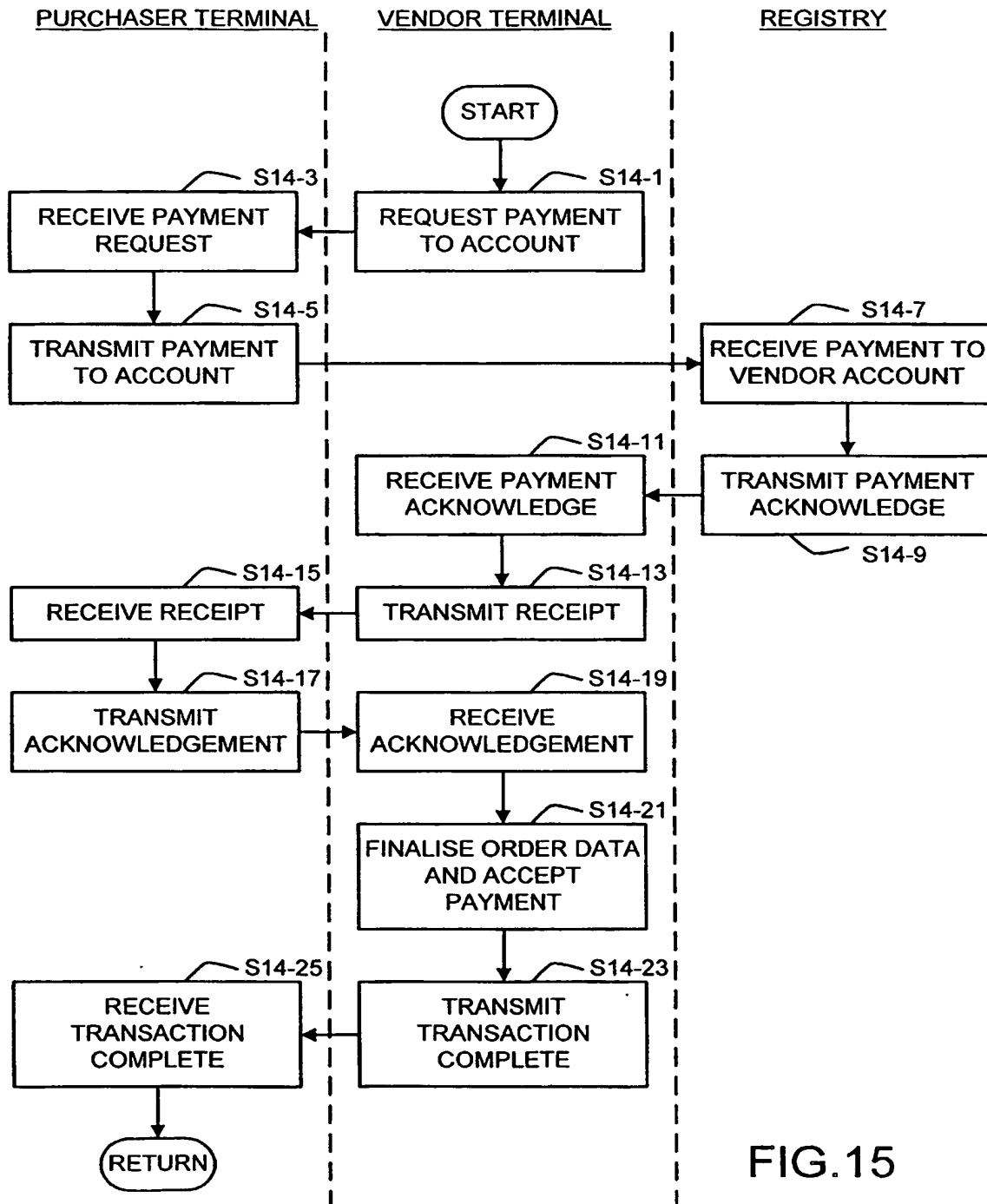
PAYMENT TO REGISTRY ACCOUNT FROM PURCHASER SMART CARD

FIG.15

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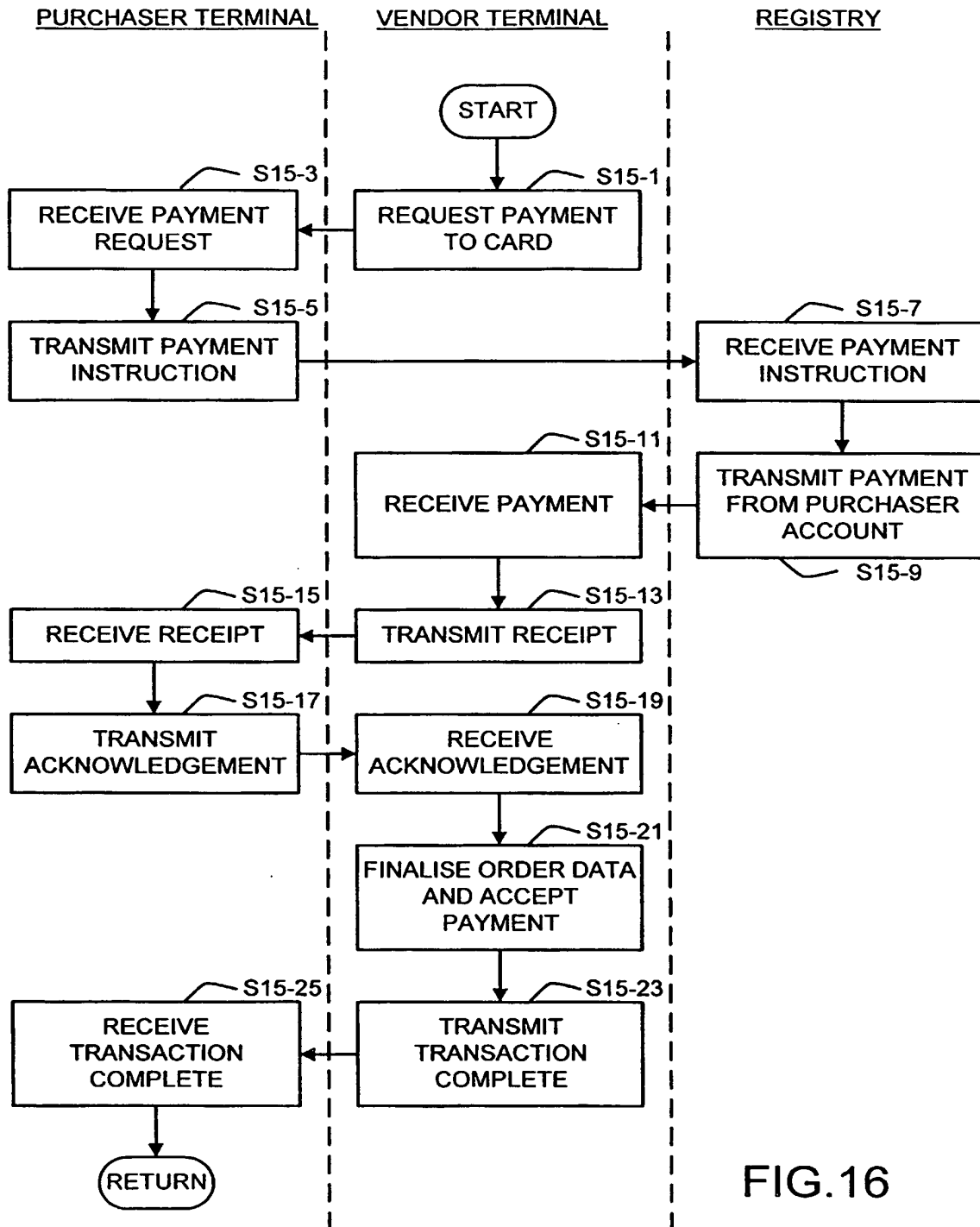
PAYMENT TO CARD FROM REGISTRY ACCOUNT

FIG.16

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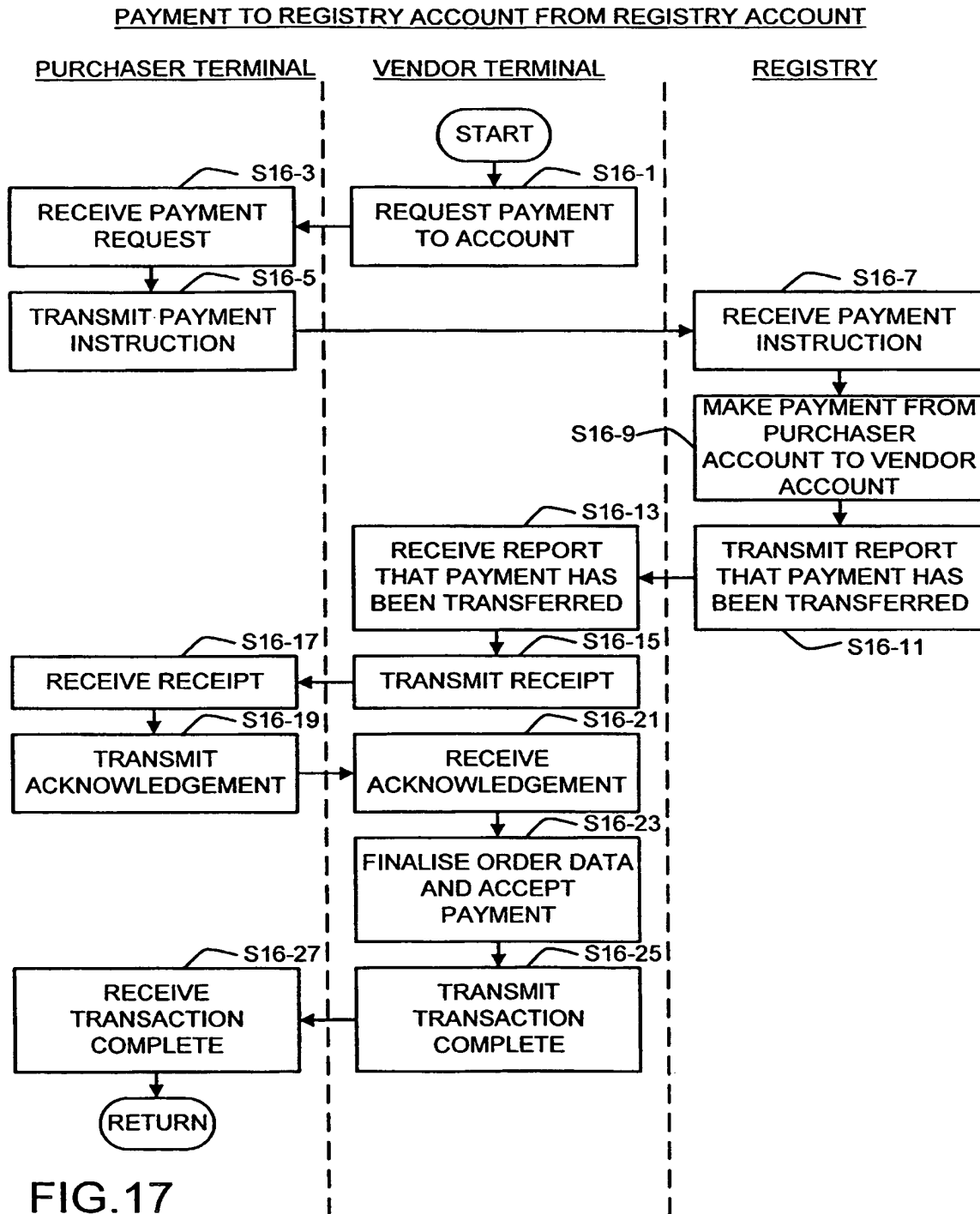


FIG.17

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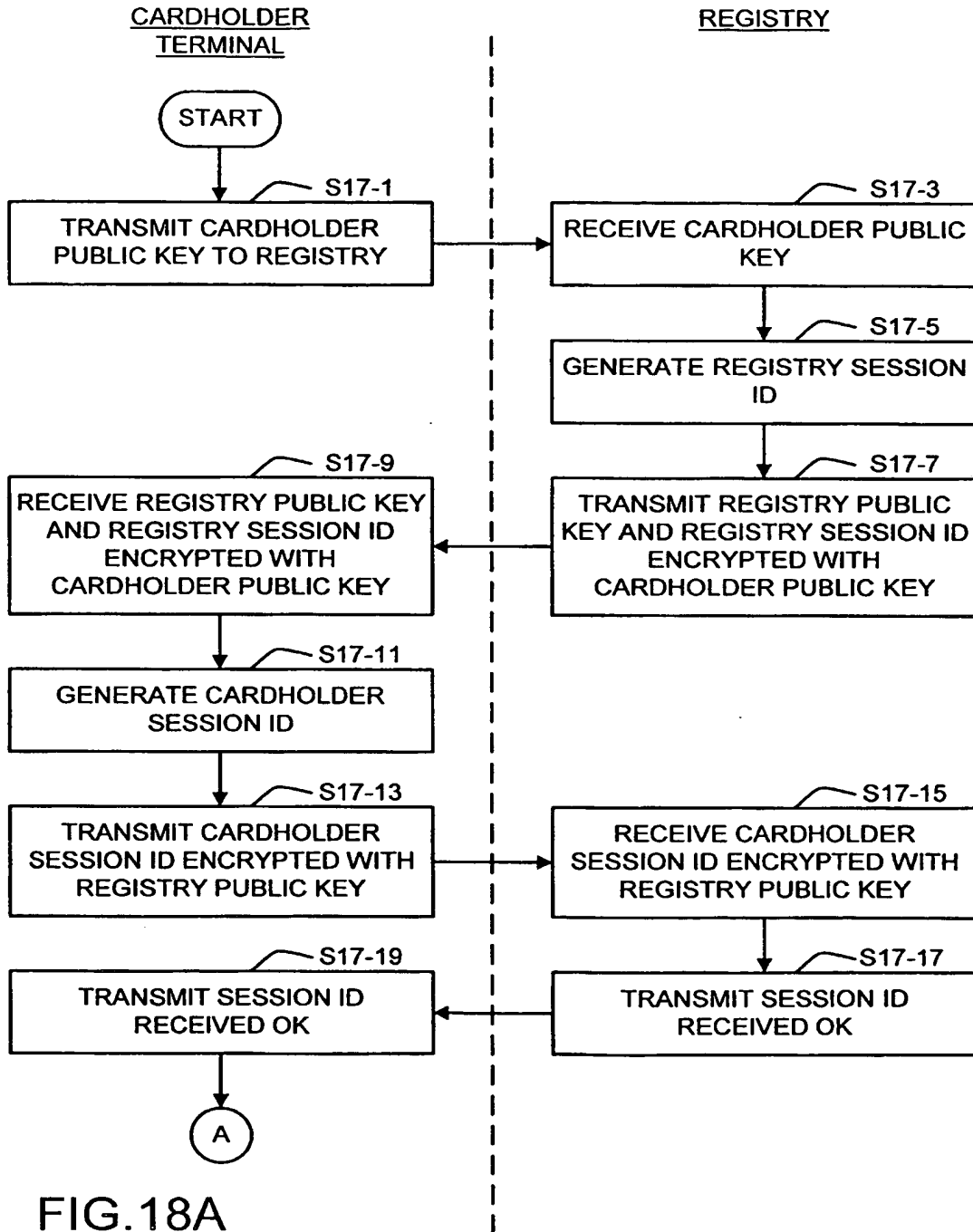
CONVERT CURRENCY WITHIN REGISTRY ACCOUNT

FIG.18A

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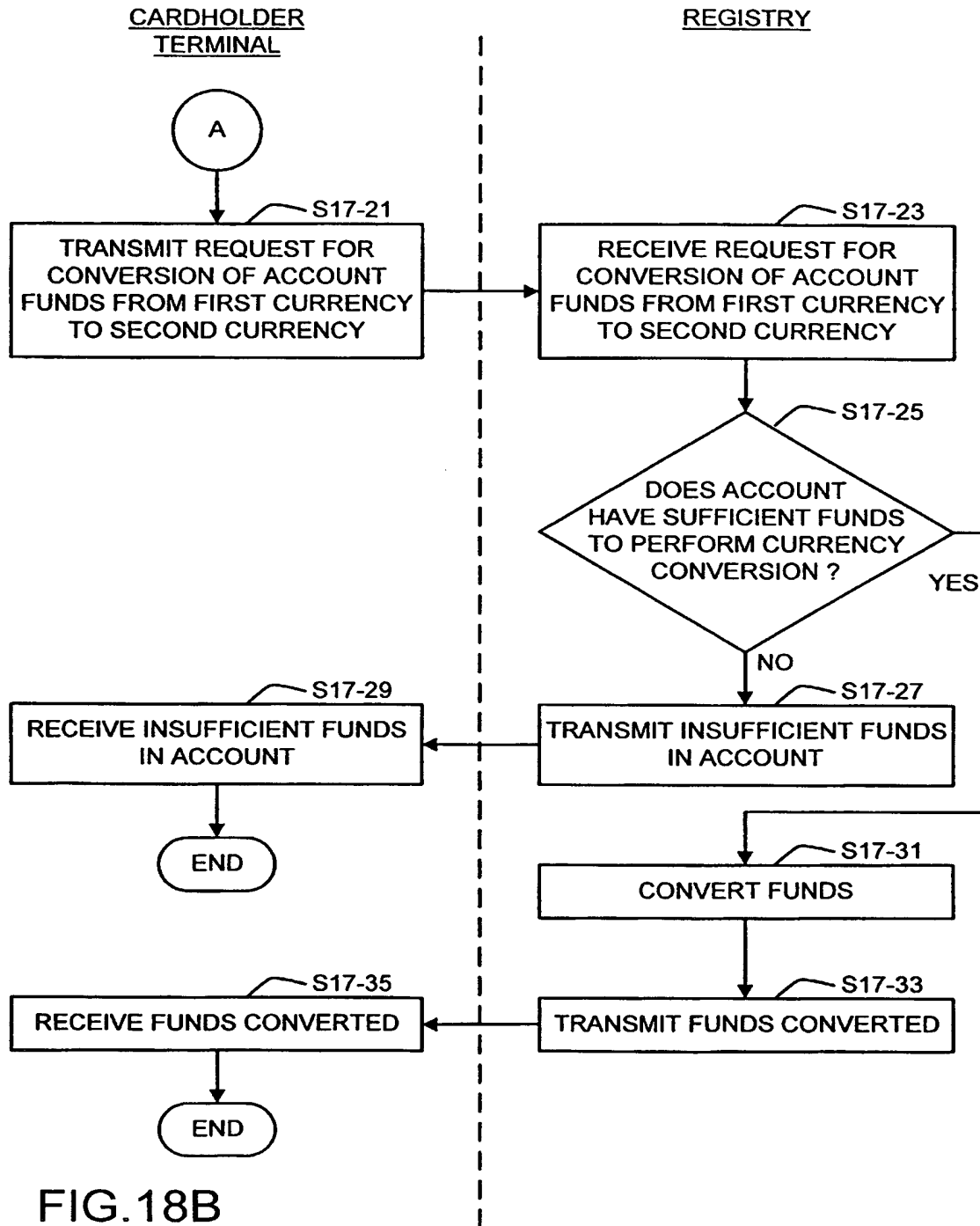
CONVERT CURRENCY WITHIN REGISTRY ACCOUNT

FIG.18B

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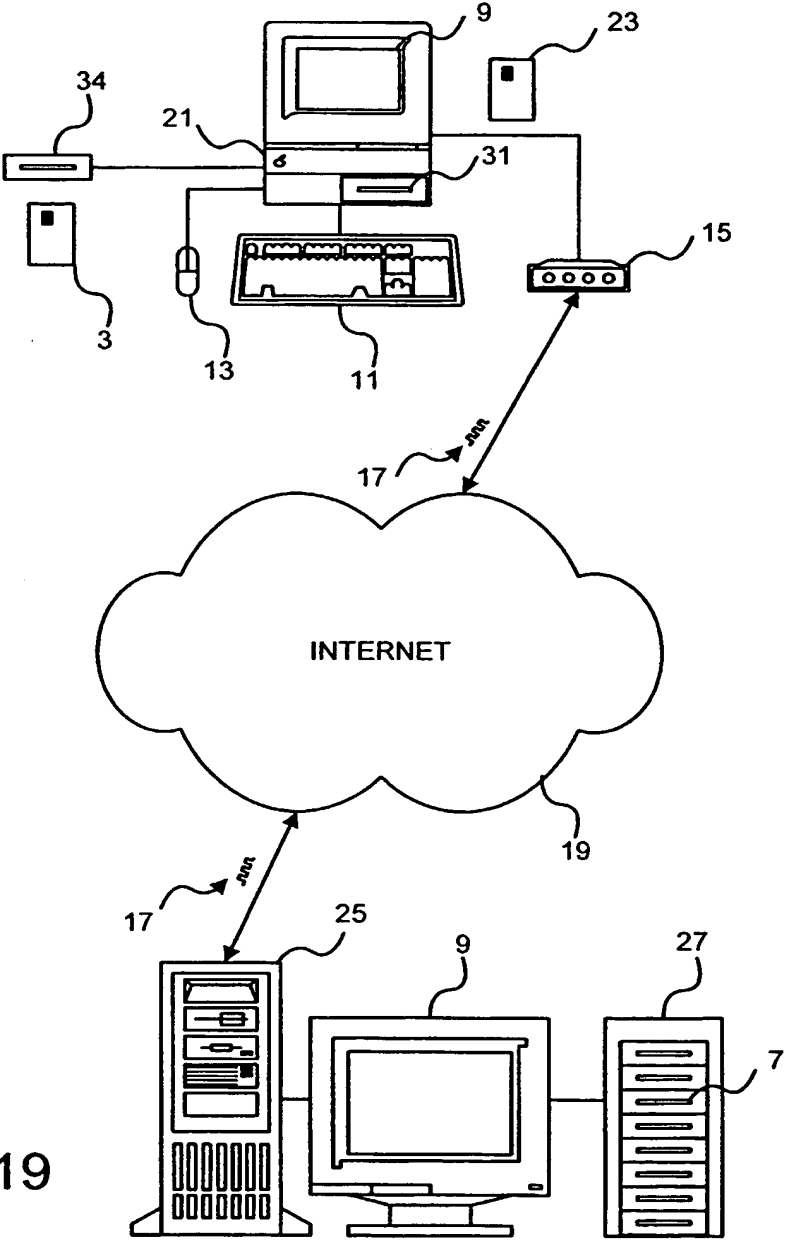


FIG.19

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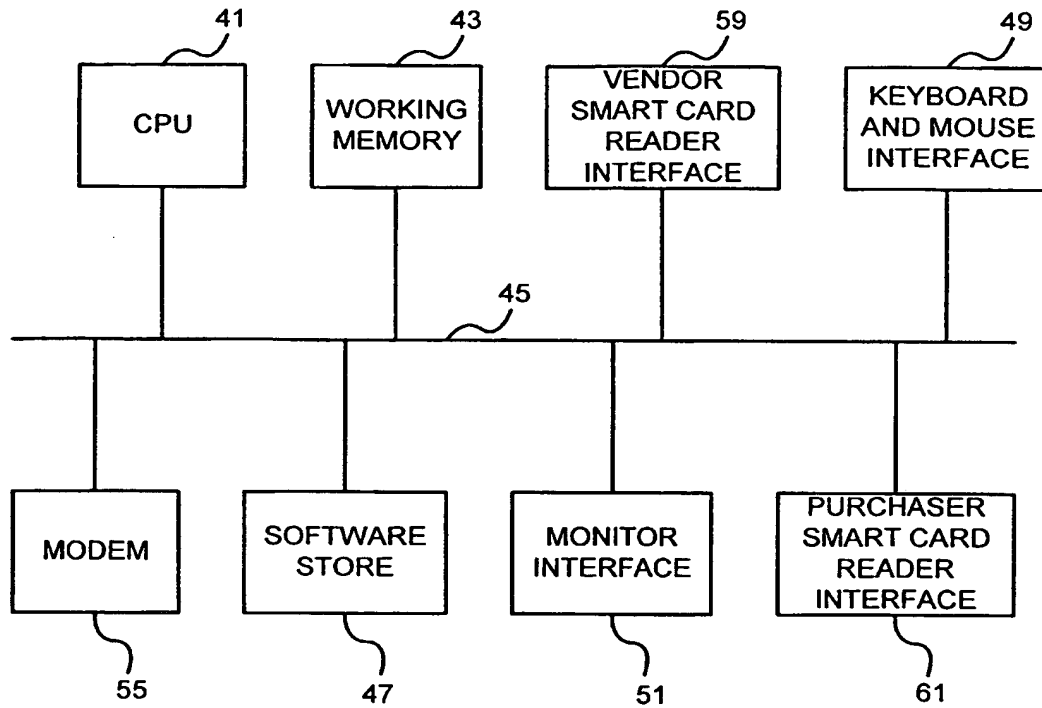


FIG.20

INTERNATIONAL SEARCH REPORT

Int. Patent Application No
PCT/GB 02/01634

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 007F7/08 007F7/10		
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 007F 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.
A	EP 0 421 808 A (BELAMANT SERGE CH P ;MANSVELT ANDRE PETER (ZA)) 10 April 1991 (1991-04-10) column 3, line 57 -column 4, line 22 figure 1 column 7, line 34 -column 9, line 20 ---	1,11,12, 20,24, 27,28, 31,32, 34,37, 40,41, 46-48
A	US 5 623 547 A (JONES TIMOTHY L ET AL) 22 April 1997 (1997-04-22) column 5, line 30 -column 6, line 20 column 7, line 5 -column 9, line 23 --- -/--	17,18, 20, 34-37, 41,43
☒ Further documents are listed in the continuation of box C. ☒ 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 *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *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 *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *G* document member of the same patent family		
Date of the actual completion of the international search 14 August 2002		Date of mailing of the international search report 22/08/2002
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Bocage, S

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INTERNATIONAL SEARCH REPORT

In International Application No
PCT/GB 02/01634

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00 77746 A (IBM UK ; IBM (US)) 21 December 2000 (2000-12-21) page 4, line 31 -page 5, line 8 page 6, line 31 -page 7, line 2 page 8, line 33 -page 9, line 33 page 11, line 25 -page 13, line 36 page 15, line 26 -page 16, line 8 ----	3, 7, 34, 35, 40, 45
A	EP 0 807 908 A (CERTICOM CORP) 19 November 1997 (1997-11-19) column 5, line 30 -column 6, line 7 column 6, line 43 -column 7, line 27 ----	17, 19, 20, 34, 35, 44, 45
A	WO 00 30051 A (WINTRISS MARC V) 25 May 2000 (2000-05-25) ----	
A	US 4 862 501 A (MIZUTANI HIROYUKI ET AL) 29 August 1989 (1989-08-29) -----	

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

page 2 of 2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 02/01634

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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US 5623547	A	22-04-1997	US 5778067 A AT 127949 T AU 653721 B2 AU 7664491 A BR 9105713 A CA 2058982 A1 CN 1057535 A ,B DE 69112975 D1 DE 69112975 T2 DE 479982 T1 DK 479982 T3 EP 0479982 A1 ES 2034929 T1 WO 9116691 A1 GR 92300099 T1 GR 3017457 T3 HK 175596 A KR 145331 B1 RU 2108620 C1 ZA 9102632 A	07-07-1998 15-09-1995 13-10-1994 11-11-1991 19-05-1992 13-10-1991 01-01-1992 19-10-1995 29-02-1996 08-07-1993 13-11-1995 15-04-1992 16-04-1993 31-10-1991 16-03-1993 31-12-1995 27-09-1996 17-08-1998 10-04-1998 28-04-1993
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Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
24 April 2003 (24.04.2003)

PCT

(10) International Publication Number
WO 03/034267 A1

(51) International Patent Classification⁷: G06F 17/00

(21) International Application Number: PCT/US02/33089

(22) International Filing Date: 17 October 2002 (17.10.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/346,824 18 October 2001 (18.10.2001) US

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(81) Designated States (*national*): AE, AL, AM, AT, AU, AZ,
BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK,
DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL,
IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,
LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT,
RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA,
UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK,
TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: MULTIMEDIA INTELLIGENT BUSINESS CARD SYSTEM

(57) Abstract: A multimedia intelligent business card system allows multimedia and Web content to be stored on a smart card. The invention automatically and selectively translates each file, URL, or file references as they should be when the contents of the smart card are read. The invention waits for a smart card to be inserted into a smart card reader attached to or resident in the host computer and intelligently distinguishes between a multimedia, Web-enabled, or combination smart card. A multimedia file/mp3 file/playlist or URL address is accessed from the smart card. The multimedia player required to play the accessed file/playlist or the browser required to display the accessed URL is determined and the accessed file/playlist is sent to the multimedia player and played to the user or the accessed URL is sent to the browser and the Website is displayed to the user. The invention enables multiple auto play from multimedia files/MP3 playlist and multiple automatic connection with multiple URLs. A hotkey is defined on the host computer, for example, <F12>. If the user presses the hotkey during playback, then the invention will access the smart card for the next file, mp3 file in the playlist, or URL, if it exists.

WO 03/034267 A1

Multimedia Intelligent Business Card System

5

BACKGROUND OF THE INVENTION

TECHNICAL FIELD

10 The invention relates to advertising using smart card media. More particularly, the invention relates to installing, playing, and displaying multimedia and Web content via smart cards in a computer.

15

DESCRIPTION OF THE PRIOR ART

In these days of electronic advertising there are a plethora of ways to reach consumers and businesses. Advertising through media such as television, radio, print, Web pages, and pop-up windows in Web browsers are but a few. These types of media reach the consumer through centralized methods, e.g., television broadcast stations and Web servers.

When advertisers want to reach the consumer through tangible media, they resort to direct mailings or physical handouts. These type of approaches are typified by an advertiser sending a CD-ROM directly to a potential client or consumer. The CD-ROM can contain multimedia advertisements, music, even photos. The CD-ROM is also ubiquitous in trade shows where vendors hand out CD-ROMs containing the same type of multimedia product showcases or company public relations.

30 CD-ROMs however, have become large in comparison to other recordable media.

Presently, smart cards are used primarily for facilitating financial transactions. However, because smart cards include at least a limited amount of non-volatile readable and writeable memory and may also include a programmable processor, they inherently possess a capability for use in applications other than financial transactions. Storing data into a smart card, accessing that data, and activating a smart card's processor to execute a computer program all require that the smart card be interconnected with some type of reader/terminal.

Smart card technology has made impressive advances in the past few years. The cost of manufacturing smart cards has seen dramatic decreases. Smart cards come in two flavors: a processor-based smart card and a low-cost memory smart card. The form factors of these smart cards are the size of credit cards. As noted above, one of the financial applications of the higher cost processor-based smart cards is the intelligent credit card. Credit card manufacturers have embedded the smart card technology into a credit card without changing the dimensions of the standard credit card.

The use of smart card technology beyond the financial arena has been very limited. With the cost of low-cost memory smart cards decreasing because of production costs, their usefulness in high number applications are becoming attractive.

It would be advantageous to provide a multimedia intelligent business card system that allows a vendor to install multimedia and Web-based content onto a smart card that is played or displayed on a target audience's computer. It would further be advantageous to provide a multimedia intelligent business card system that plays or displays the smart card resident multimedia and Web content on the target audience's computer without operational effort by the user.

SUMMARY OF THE INVENTION

The invention provides a multimedia intelligent business card system. The system allows a vendor to install multimedia and Web-based content onto a smart card that is played or displayed on a target audience's computer. In addition, the invention automatically invokes the application programs required to play or display the smart card based multimedia and Web content on the target audience's computer.

A preferred embodiment of the invention allows multimedia and Web content to be stored on a smart card. A combination of text and files gives the vendor flexibility to place any type of multimedia and/or Web content and references in a smart card's memory. The invention automatically and selectively translates each file, URL, or file reference as they should be when the contents of the smart card are read.

The invention waits for a smart card to be inserted into a smart card reader attached to or resident in the host computer. The invention then intelligently distinguishes between a multimedia, Web-enabled, or combination smart card. A multimedia file/mp3 file/playlist or URL address is accessed from the smart card. The multimedia player required to

play the accessed file/playlist or the browser required to display the accessed URL is determined. The accessed file/playlist is sent to the multimedia player and played to the user or the accessed URL is sent to the browser and the Website is displayed to the user.

5

If the smart card is removed the invention closes the multimedia player and/or browser.

The invention enables multiple auto play from multimedia files/MP3 playlist and multiple automatic connection with multiple URLs. A hotkey is defined on the host computer, for example, <F12>. If the user presses the hotkey during playback, then the invention will access the smart card for the next file, mp3 file in the playlist, or URL, if it exists.

10

Other aspects and advantages of the invention will become apparent from the following detailed description in combination with the accompanying drawings, illustrating, by way of example, the principles of the invention.

15

BRIEF DESCRIPTION OF THE DRAWINGS

5 Fig. 1 is a block schematic diagram showing multimedia and Web content stored on a smart card according to the invention;

Fig. 2 is a schematic diagram showing a smart card reader connected to a computer system running the invention's application program according to the invention;

10 Fig. 3 is a block schematic diagram of a flowchart showing the handling of a multimedia enabled smart card according to the invention;

Fig. 4 is a block schematic diagram of a flowchart showing the handling of a Web enabled smart card according to the invention; and

15

Fig. 5 is a block schematic diagram of a task-oriented viewpoint of a preferred embodiment of the invention illustrating the modules involved with identifying and processing data accessed from a smart card according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

The invention is embodied in a multimedia intelligent business card system. A system according to the invention allows a vendor to install multimedia and Web-based content onto a smart card that is played or displayed on a target audience's computer. In addition, the automatically invokes the application programs required to play or display the smart card based multimedia and Web content on the target audience's computer.

The invention provides an application environment on a host computer for automatically playing and/or displaying multimedia and Web content residing on a smart card.

Referring to Fig. 1, the invention stores both multimedia, Web content, and file names on a smart card 101. For example, filenames such as residentfile.wav 103 can be placed on the smart card even though the file itself is resident on the host computer. Entire files such as song2.mp3 104 can be placed in the memory of the smart card. Lists of multimedia files 102 can also be placed in the smart card's memory.

The invention allows Web universal resource locators (URL) 106 to be stored on the smart card 101 as well as hypertext markup language (HTML) files 107. This combination of text and actual files gives the vendor flexibility to place any type of multimedia 102 or Web 105 content and references in a smart card's memory. The invention further allows a mix of multimedia 102 and Web 105 content to be stored in the smart card. The invention automatically and selectively translates each file, URL, or file reference as they should be when the contents of the smart card are read.

With respect to Fig. 2, the invention installs a smart card management application program on the host computer 201. The smart card management application program detects if a smart card 203 is inserted into an attached or internal smart card reader/terminal 202. The smart card management application program determines if the smart card 203 is a multimedia/Web enabled smart card.

For example, if the smart card 203 contains a file name, the smart card management application program reads the smart card 203 and finds the file name (*e.g.*, Disney.wav).

The smart card management application program knows that it has encountered a file name and looks on the local storage 204 on the host computer 201 for the file name on a certain path or folder (*e.g.*, MultiMedia Folder). When the file is found, the smart card management application program plays or displays the file by executing the

appropriate application program for the file. The application program is passed the path to the file. Files can designate any type of music, audio, movie, or picture.

5 If several file names are present on the smart card 203, the smart card management application program will play each one in sequence or the user can manually sequence through the files.

10 The smart card 203 can also contain actual files as described above. For example, an HTML file that defines a menu can be stored on the smart card 203 along with several movie files. The smart card management application program displays the HTML menu page and plays the movie files from the smart card 203. This can apply to multi-level advertisements, brochures, movie previews, product reviews, etc.

15 The invention, for example, allows companies to give a person a low-cost smart card at an industry show. The smart card contains the companies' advertisements or product brochures. The person takes the smart card home or to the office and inserts the smart card into the card reader in his computer. The invention automatically plays or displays the advertisements or brochures on the smart card to the person. The invention offers a low-cost approach to targeted advertising.

20 The invention intelligently distinguishes between a multimedia or Web-enabled smart card. When the user inserts a smart card into the host computer's smart card reader, the invention identifies if the smart card is a multimedia card or Web-enabled card or a combination. The invention then executes the proper sequence of events for that smart card. The invention can make certain judgement calls when, for example, the smart card contains both multimedia and Web content. If the user does not have an Internet connection, the invention can play the multimedia content on the smart card.

30 Referring to Fig. 3, a flowchart is shown for handling multimedia smart cards. The invention is launched after the operating system boots 301. The invention waits for a smart card to be inserted into the smart card reader attached to or resident in the host computer 302.

35 The invention intelligently distinguishes between a multimedia or Web-enabled smart card. Here, the smart card is a multimedia smart card. The invention accesses a multimedia file/mp3 file/playlist on the smart card 303. The multimedia player required to play the accessed file/playlist is determined and the invention checks if the multimedia player is already running 304. If the desired multimedia player is not running, then the invention starts the multimedia player 305.

The accessed file/playlist is sent to the multimedia player and played to the user 306.

5 If the smart card is removed during this time 307, then the invention automatically closes the multimedia player 308. It then waits for a smart card to be inserted into the card reader 302.

10 The invention enables multiple auto play from the multimedia files/MP3 playlist. It allows the user to define a hotkey on the host computer, for example, <F12>. If the user presses the hotkey during playback 309, then the invention looks at the smart card and accesses the next file or mp3 file in the playlist, if they exist 310. The appropriate multimedia player is started for the accessed file and the file is played 306.

15 Removal of the smart card or the user pressing the hotkey can occur at any time during playback and will be acted upon.

20 With respect to Fig. 4, a flowchart is shown for handling Web-enabled smart cards. The invention is launched after the operating system boots 401. The invention waits for a smart card to be inserted into the smart card reader attached to or resident in the host computer 402.

25 As noted above, the invention intelligently distinguishes between a multimedia or Web-enabled smart card. Here, the smart card is a Web-enabled smart card. The invention accesses a URL address from the smart card 403. The browser required to display the accessed URL is determined and the invention checks if the browser is already running 404. If the desired browser is not running, then the invention starts the browser 405.

30 The accessed URL is sent to the browser and the Website is displayed to the user 406.

If the smart card is removed during this time 407, then the invention automatically closes the browser 408. It then waits for a smart card to be inserted into the card reader 402.

35 The invention enables multiple automatic connection with multiple URLs. As described above, the invention allows the user to define a hotkey on the host computer, for example, <F12>. If the user presses the hotkey after display of the URL 409, then the invention looks at the smart card and accesses the next URL on the smart card, if one exists 410. The next URL is sent to the browser and the Website is displayed by the browser 406.

Removal of the smart card or the user pressing the hotkey can occur at any time during playback and will be acted upon.

- 5 Referring to Fig. 5, a task viewpoint of the invention is shown. The Read Smart Card module 501 waits for a smart card 506 to be inserted into the smart card reader attached to or resident in the host computer.

10 The Data Manager 504 intelligently distinguishes between a multimedia, Web-enabled, or combination smart card. The Data Manager module 504 accesses a multimedia file/mp3 file/playlist or URL address from the smart card via the Read Smart Card module 501. If the smart card is a combination smart card, the Data Manager 504 makes a decision as to which it will play. Some vendors may have duplicate material in both multimedia format and Web format. The choice of which to play may be dependent
15 upon which would result in the highest quality playback as well as the most up to date. If the user has a high-speed broadband connection, then the Web content would be the most up to date. If the user does not have an Internet connection, then playing the multimedia content would be best.

20 The multimedia player required to play the accessed file/playlist or the browser required to display the accessed URL is determined. The Data Manager 504 checks if the multimedia player is already running through the Application Manager 503. If the desired multimedia player is not running, then the Data Manager 504 starts the multimedia player in local storage 505 via the Application Manager 503. If the desired
25 browser is not running, then the Data Manager 504 starts the browser in local storage 505 via the Application Manager 503.

The accessed file/playlist is sent to the multimedia player and played to the user or the accessed URL is sent to the browser and the Website is displayed to the user.

30 If the smart card is removed during this time, then the Read Smart Card module 501 notifies the Data Manager 504 which has the Application Manager 503 close the multimedia player and/or browser. The invention then waits for a smart card to be inserted into the card reader.

35 The Data Manager 504 enables multiple auto play from the multimedia files/MP3 playlist and multiple automatic connection with multiple URLs. The User Interface module 502 allows the user to define a hotkey on the host computer, for example, <F12>. If the user presses the hotkey during playback, then the User Interface module

502 will catch the keypress. The Data Manager 504 looks at the smart card 506 via the Read Smart Card module 501 and accesses the next file, mp3 file in the playlist, or URL, if it exists.

- 5 Although the invention is described herein with reference to the preferred embodiment, one skilled in the art will readily appreciate that other applications may be substituted for those set forth herein without departing from the spirit and scope of the present invention. Accordingly, the invention should only be limited by the Claims included below.

CLAIMS

1. A process for storing multimedia and Web content on a smart card and
5 displaying the multimedia and Web content on a host computer connected to a smart
card reader, comprising the steps of:
detecting that a smart card has been inserted into said smart card reader;
identifying whether said smart card contains multimedia content, Web content, or
both;
10 playing said multimedia content if said smart card contains multimedia content; and
displaying said Web content if said smart card contains Web content.
2. The process of Claim 1, wherein said smart card can contain any of: multimedia
files, Web files, universal resource locators (URL), music files, playlists, photos, and file
15 references.
3. The process of Claim 1, further comprising the steps of:
determining an appropriate multimedia player required to play said multimedia
content and/or an appropriate browser required to display said Web content; and
20 starting said appropriate multimedia player and/or said appropriate browser if
said appropriate multimedia player and/or said appropriate browser is not running.
4. The process of Claim 3, wherein if said smart card is removed then said
appropriate multimedia player and/or said appropriate browser is automatically closed.
25
5. The process of Claim 1, further comprising the step of:
defining a hotkey; and
wherein if said hotkey is pressed by a user then a next multimedia content is
played or next Web content is displayed if one exists on said smart card.
30
6. An apparatus for storing multimedia and Web content on a smart card and
displaying the multimedia and Web content on a host computer connected to a smart
card reader, comprising:
a module for detecting that a smart card has been inserted into said smart card
35 reader;
a module for identifying whether said smart card contains multimedia content,
Web content, or both;

a module for playing said multimedia content if said smart card contains multimedia content; and

a module for displaying said Web content if said smart card contains Web content.

5

7. The apparatus of Claim 6, wherein said smart card can contain any of: multimedia files, Web files, universal resource locators (URL), music files, playlists, photos, and file references.

10 8. The apparatus of Claim 6, further comprising:

a module for determining an appropriate multimedia player required to play said multimedia content and/or an appropriate browser required to display said Web content; and

15 a module for starting said appropriate multimedia player and/or said appropriate browser if said appropriate multimedia player and/or said appropriate browser is not running.

9. The apparatus of Claim 8, wherein if said smart card is removed then said appropriate multimedia player and/or said appropriate browser is automatically closed.

20

10. The apparatus of Claim 6, further comprising:

a module for defining a hotkey; and

wherein if said hotkey is pressed by a user then a next multimedia content is played or next Web content is displayed if one exists on said smart card.

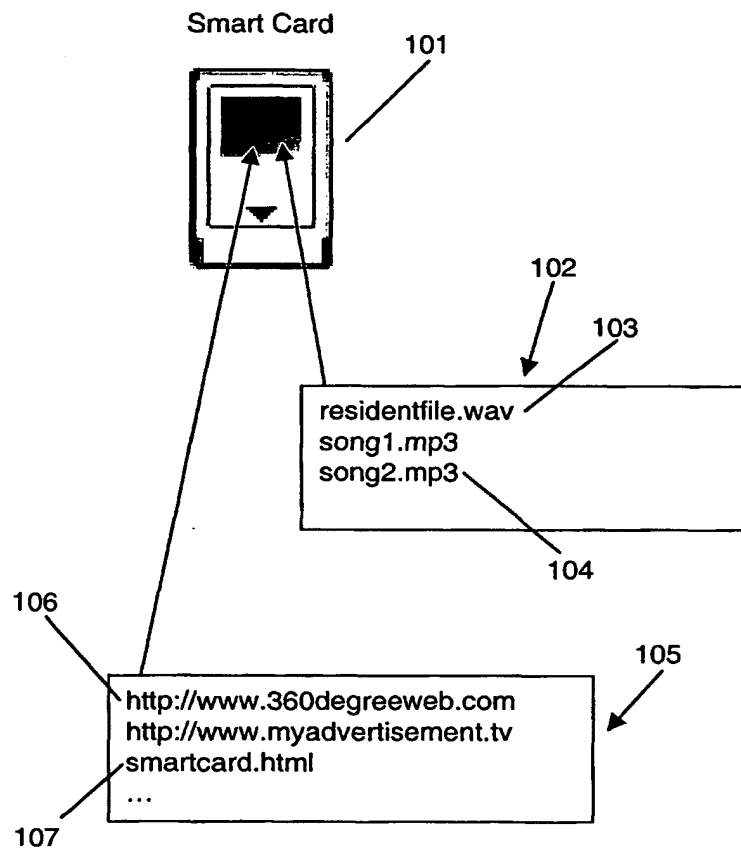


Fig. 1

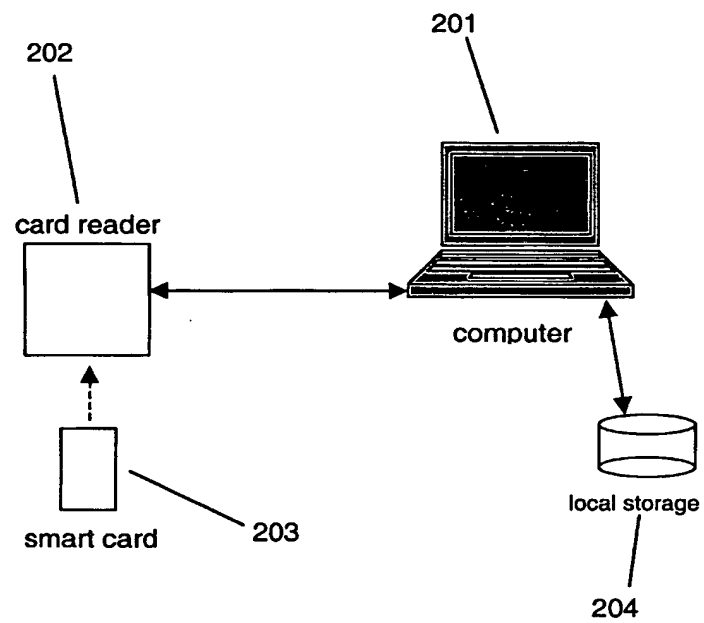
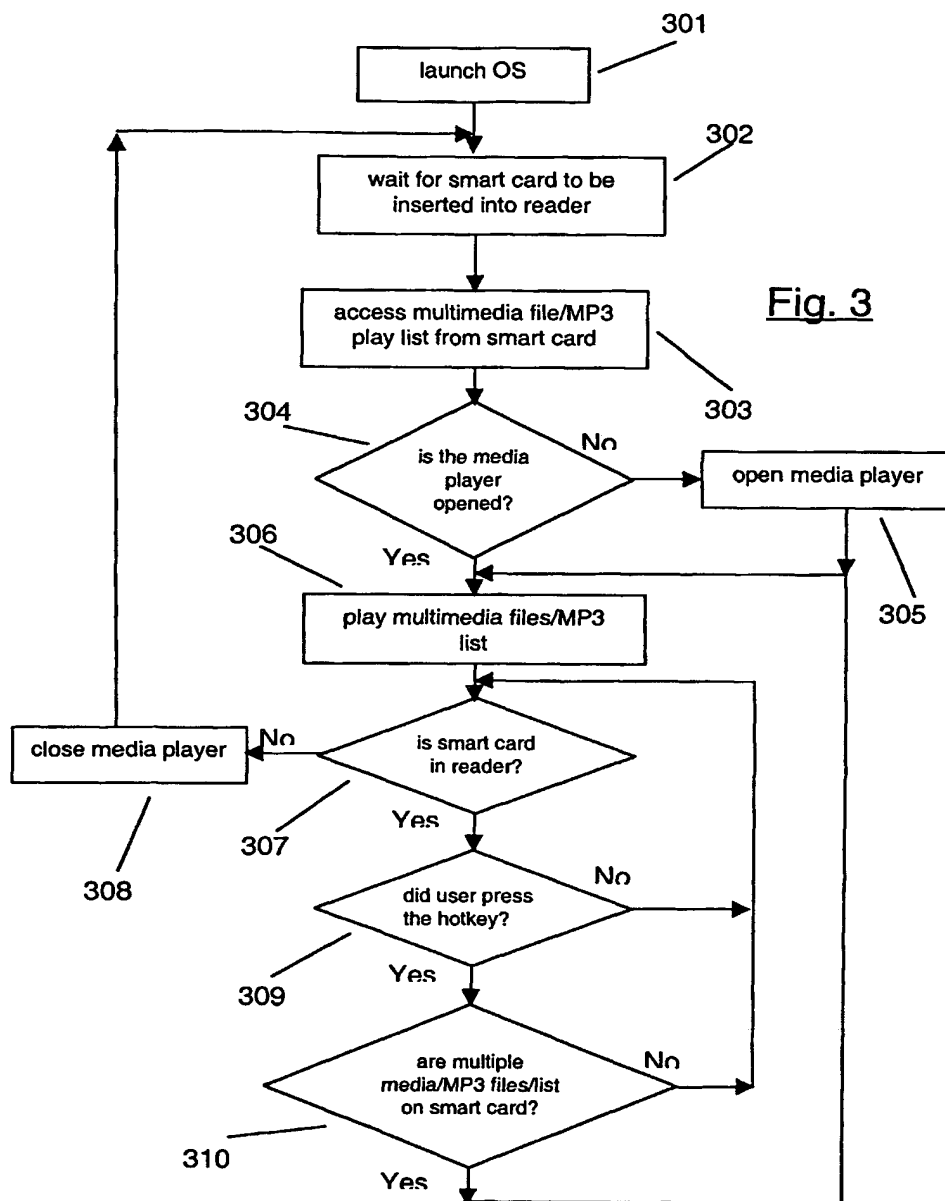
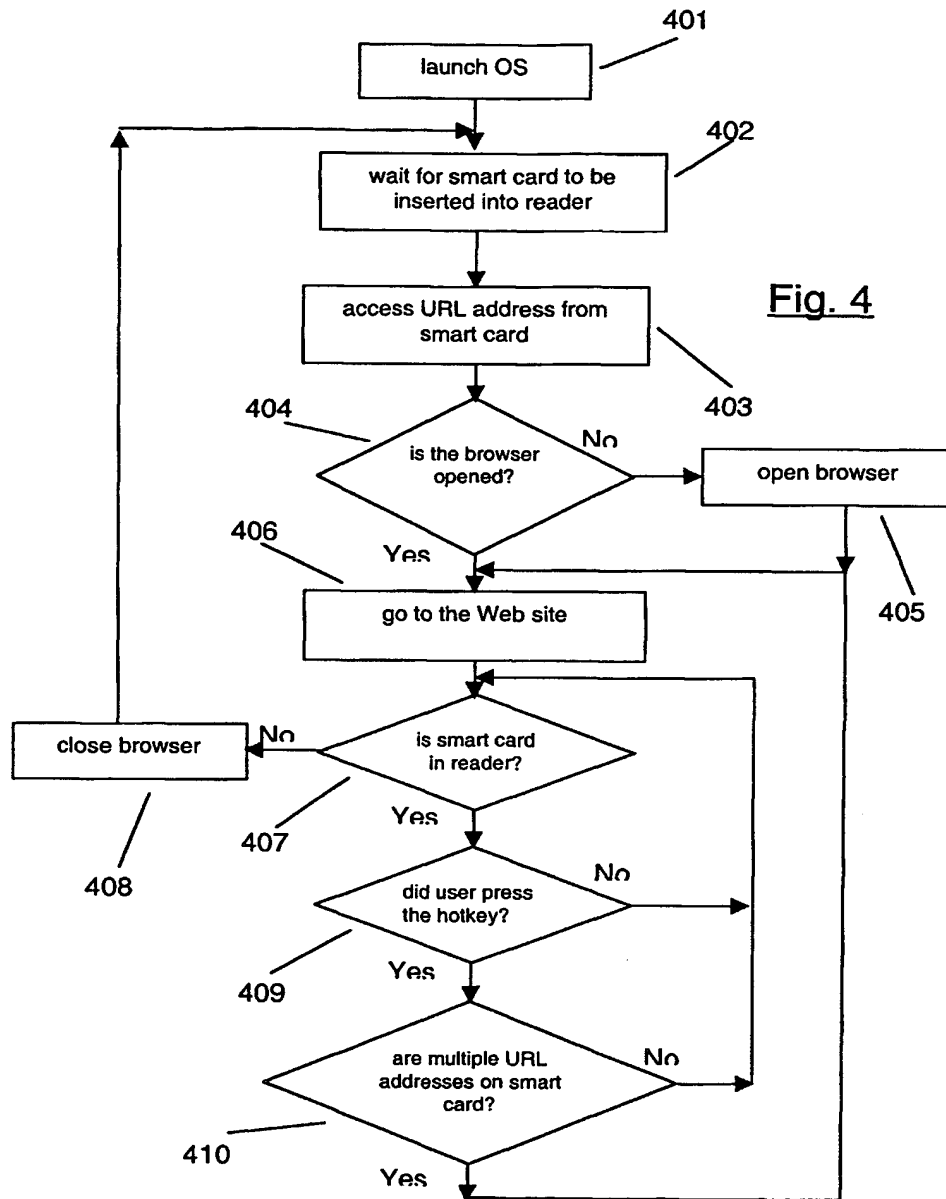


Fig. 2





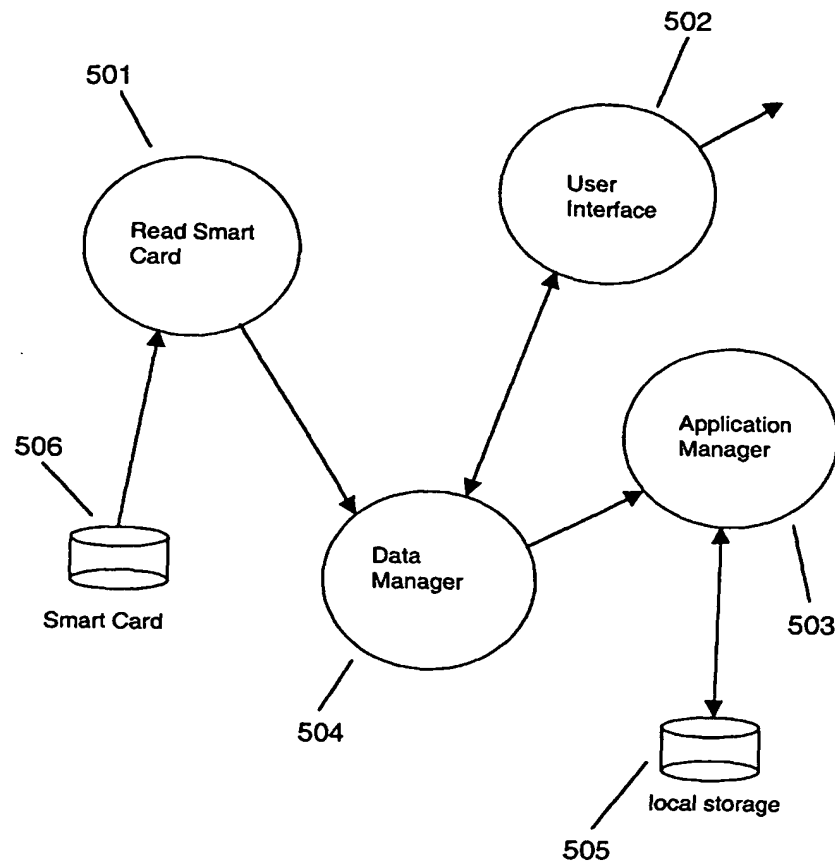


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/33089

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17/00
US CL : 235/375,380,382,492

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)
U.S. : 235/375,380,382,492

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 6,312,175 B1 (Lum) 06 November 2001 (06.11.2001), see entire document,	1-10
A	US 6,481,621 B1 (Herrendoerfer et al.) 19 November 2002 (19.11.2002), see entire document,	1-10
Y, P	US 6,390,374 B1 (Carper et al.) 21 May 2002 (21.05.2002), see entire document,	1-10
Y	US 6,296,191 B1 (Hamann et al.) 02 October 2001 (02.10.2001), see entire document.	1-10

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

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- "O" document referring to an oral disclosure, use, exhibition or other means
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- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "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
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

12 December 2002 (12.12.2002)

Date of mailing of the international search report

24 MAR 2003

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 August 2003 (14.08.2003)

PCT

(10) International Publication Number
WO 03/067369 A2

(51) International Patent Classification⁷: G06F
(21) International Application Number: PCT/US03/02064
(22) International Filing Date: 23 January 2003 (23.01.2003)
(25) Filing Language: English
(26) Publication Language: English
(30) Priority Data:
60/354,884 6 February 2002 (06.02.2002) US
10/244,092 13 September 2002 (13.09.2002) US

(81) Designated States (*national*): AU, BR, CA, CN, DE, GB, ID, IL, IN, JP, KR, MX, NO, NZ, PH, PL, RU, SG, TR, US, VN, ZA.

(84) Designated States (*regional*): European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR).

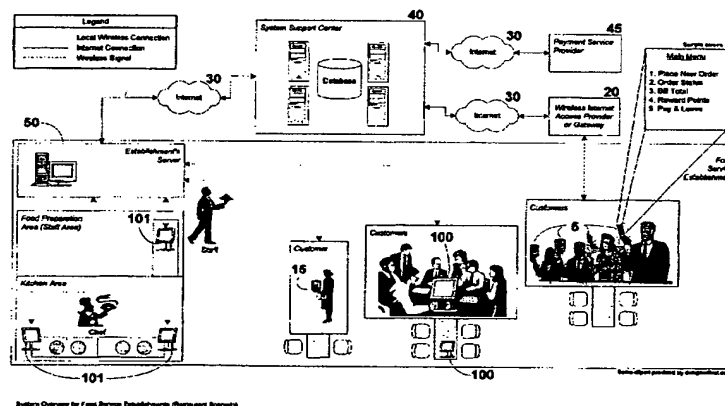
Published:

— without international search report and to be republished upon receipt of that report

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(72) Inventor: HERNBLAD, Konrad [US/US]; 867 N. Marshall Place, Philadelphia, PA 19123-2002 (US).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A CUSTOMER-BASED WIRELESS ORDERING AND PAYMENT SYSTEM FOR FOOD SERVICE ESTABLISHMENTS



(57) Abstract: An interactive system, which allows customers to electronically place and pay for menu orders by themselves at food service establishments and which processes said orders, is disclosed. The invention comprises at least one ordering device, which is either a mobile device or a thin, battery-powered, touch-terminal, both of which contain a data input mechanism, display, and wireless communication mechanism; one or more servers for processing said menu orders and payments; means for adding menu items to said menu order either by selecting from a textual and/or graphical list or by entering said menu items' corresponding code; means for transmitting said order to food service establishment; means affixed to said terminal for accepting payment using cashless payment mediums, which include credit cards, debit cards, smart cards, pre-paid cards, or other cashless payment methods; and a means for said mobile devices to pay for said orders using said cashless payment mediums.

106

Title of the Invention

A Customer-Based Wireless Ordering and Payment System
for Food Service Establishments

Field of the Invention

This present invention relates to the field of enhancing food order placement, processing, and payment, and improving the overall customer experience at restaurants and other food service establishments. In particular, this invention relates to a system including thin, touch-screen terminals and mobile devices that connect wirelessly to one or more servers, and allow customers to independently place and pay for food-related orders quickly and efficiently.

Background of the Invention***Industry Description and Trends***

Food service establishments worldwide continuously strive to provide top-quality customer service and serve their clientele as quickly as possible while keeping costs low. Below is a description of some of the trends that are making it difficult for food service operators to accomplish these goals. Although some of the statistics below are specific to the U.S., these numbers and perhaps more important, the observations from customers' perspectives give insight into some of the challenges facing this industry in many countries.

Recently, there have been many indicators that the available labor pool in the restaurant industry is decreasing. Since the late 1970's, the number of teenagers as well as the proportion of working high school students in the U.S. has declined. The National Restaurant Association reported in its 2000 Restaurant Industry Forecast that "table-service- and quick-service-restaurant

operators alike have identified finding qualified, motivated labor as their biggest challenge for 2000... and the problem is expected to get worse". The U.S. Bureau of Labor Statistics also reported that the restaurant industry will need two million more employees by 2010. Furthermore, the high turnover rate of wait staff in the restaurant industry only compounds the problem. In fact, in 1998, full-service operations experienced median annual employee-turnover rates between 83% and 85% (depending on the type of restaurant). In order to cope with these trends, some restaurants have reported that they will begin reducing staff hours and depending more and more on automated systems.

Not only are restaurants and other food service establishments faced with a labor shortage, but they are also concerned about the increasing cost of labor. Private sector labor costs have grown the strongest in the past 10 years, with the Employment Cost Index rising 4.4% in 2000 and private-sector wages and salaries increasing 3.9%. In fact, for each dollar spent in a restaurant, 30% goes towards salaries and wages and 5% towards employee benefits; in short, a combined 35% of each dollar goes towards labor costs. Furthermore, "within the eating-and-drinking sector, wages of non-supervisory employees continue to grow faster than wages in the overall private sector." Through July 2000, the hourly salary of this group of workers increased by 4.5% on a year-to-date basis. These higher salaries/wages, as well as higher employee-benefit expenses, have significantly driven up operating expenses for restaurants. If this trend continues and restaurant prices do not increase accordingly, then labor costs will continue to deteriorate restaurants' pre-tax income and profits, which is currently only 4% of each restaurant dollar.

Within the restaurant and food service industry, there is constant competition among establishments to retain current customers and to attract new ones. There are clear indications of the growing importance of implementing technological solutions and unique ideas to help food service establishment remain competitive. Consumers also desire more entertainment value. These are evident signs that food service establishments will need to provide more innovation to survive in an extremely competitive environment.

Customers are becoming more and more educated and are beginning to expect a higher level of knowledge and customer service from food service establishment employees, particularly those at restaurants. The wait staff needs to be more educated, more involved, and better able to describe every item on menus (i.e. wine) in detail. This will require establishments to invest more money in employee training, which will cause the establishments to bare greater costs, which will in turn most likely be passed on to the paying consumer through increased food and drink prices.

Another trend is that some staff at food service establishments, particularly restaurants, which accept credit cards as a method of payment, have been reported as practicing "skimming."

Skimming is the practice of an employee taking a customer's credit card and when the customer is not looking, swiping the credit card through a small device, worn around the belt, to steal the customer's credit card information. Such reports can have riveting effects in the food service industry because they can cause customers to lose trust in food service establishments.

There are also statistics that indicate that more and more people are beginning to dine out than ever before. In fact, the percentage of food dollar spent outside the home (at restaurants and other food service establishments) has increased from 25% in 1955 to 46% in 2001, and is predicted to reach 53% by 2010. Furthermore, in some countries, it is more common for people to eat out than to eat at home because of busy work schedules, lifestyle, culture, etc.

Globalization is also having a tremendous impact on the restaurant and food service industry, as more and more people are traveling between countries, indicating the need to be able to service an international customer base speaking different languages.

Some in the restaurant industry believe that putting an ordering screen on the table is too much to expect from a customer and lacks personal interaction. However, people are increasing becoming more comfortable with using technologies in their everyday lives; examples of this include the proliferation of email usage compared to 10 years ago and the widespread usage of cell phones and other handheld, mobile devices. Furthermore, technologies can be created in such a way that personal interaction does exist (e.g. ease of use, online help, personalization, and the ability to summon a staff person in the event of a problem). A system can be designed such that customers can easily order items by themselves and only require human intervention when absolutely necessary. It seems that many customers would prefer not to have their conversations needlessly interrupted by wait staff, but rather be able to summon the wait staff easily only when needed.

Observations from Customers' Perspectives

In visiting many restaurants and other food service establishments around the world, several observations have been made. First, customers often spend a lot of time simply waiting; waiting to have their order taken, waiting to be served their food, and waiting to pay their bill. The amount of time a customer has to wait can be attributed to the ability of the available staff people to effectively perform all of their responsibilities. As their responsibilities (taking orders, accepting payment for orders, seating customers, etc.) increase and the number of customers increase, the longer customers must wait. Also, in the restaurant setting, a lot of time is also wasted when wait staff are unable to answer questions about the menu items and need to consult a co-worker or the chef. Missed and/or forgotten orders also contribute greatly to the amount of time that a customer must

wait. Given that customers are busier than ever, they expect extremely fast, efficient service and minimal wait times. These are major inefficiencies in order placement, processing, and fulfillment for current-day food service establishments and major inconveniences for customers.

Another observation that has been made is that customers are often uncertain of particular menu items in a restaurant or other food service establishment if it is their first time ordering the particular item. Quite often establishments' menus do not provide a detailed description of the item, nor a picture, which would both serve to better inform the customer. The customer is frustrated even more when ordering menu items in restaurants and food service establishments in other countries, perhaps during a vacation or business trip. Given that the individual has never been to the country, nor speaks the language, this can be quite a trying and humiliating experience.

Given the proliferation of advancing technologies and customers' increasing use of debit cards, credit cards, smart cards, and other forms of cashless payment, inefficiencies can easily be eliminated and other value-added services offered. These cutting-edge technologies can greatly reduce establishments' costs, help retain current customers and attract new ones, and settle owners and managers' fear and uncertainty of not being able to find skilled, semi-permanent labor. In addition, services brought about by advances in technology, will also dramatically improve customers' overall experience at dining and other food service establishments.

Discussion of Prior Art

Several inventions in the patent literature, namely U.S. Patent Nos. 5,235,509, 4,530,067, 5,003,472, and 5,845,263 have made attempts to remedy the problems in the ordering process, but have not succeeded. U.S. Pat. No. 5,845,263, an interactive visual ordering system and the most advanced of the other inventions listed, makes an excellent attempt, but it still fails to provide the optimal solution, particularly concerning the logistics in the actual implementation of the embodiment.

The first point of contention is the composition of the customer's ordering device, which is composed of two separate pieces of hardware, namely a computer and a video monitor. It is unrealistic to have a computer with an attached monitor placed at each table in a restaurant or food service establishment because it would consume too much space at the table and intrude on the customers' space as well as space for the ordered food items. Furthermore, a computer with attached monitor would require two electrical sockets (one for the computer's electrical cord and one for the monitor). Even if a laptop computer is used, one electrical socket would be required. However, most restaurants do not have electrical sockets for each table in a restaurant. Requiring restaurants to install electrical outlets at each table would cost a restaurant an extreme amount of money in construction. Even if an electrical socket did exist at each table, the electrical cord(s)

extending from the computer (and monitor) would intrude on the customer's space and also be at risk to be accidentally disconnected from the computer, which would render the system unusable.

In regards to software, the system in question runs on top of a proprietary operating system (OS). Given that the server and each computer connected to the server would require a license to use the proprietary OS, this would substantially increase the overall cost of the system, not to mention placing the burden of managing the licenses on the establishment owner.

The system proposed by Patent No. 5,845,263 does not adequately address the critical issue of what would happen in the event that the system crashed. Food service establishment owners need to be reassured that any technology, in which they heavily invest and which their business is completely dependent upon, has fail-safe features and prevents or minimizes downtime as much as possible.

The functionality of Patent No. 5,845,263 is limited to simply order placement and neglects to address the payment settlement process, which needs to be integrated with the order process. Otherwise, there is no way to track whether an order was paid for or not, and in the restaurant setting, whether a customer has paid his/her bill before leaving. As a result, payment settlement is a crucial concern for establishments and needs to be addressed.

U.S. Patent No. 5,845,263 in question does not describe the logic of the entire ordering process, and thus leaves, open to question, how orders that are received by the establishment are processed by the staff (and chefs). This missing piece is undoubtedly critical to the operation of the entire system and would be questioned by any establishment owner interested in implementing the system.

In summary, Patent No. 5,845,263 uses hardware devices not suitable for a restaurant or other food service environment, can be quite costly to the establishment owner, does not provide fail-safe features for the system, and does not address critical parts of the food ordering process, namely order fulfillment and payment settlement.

U.S. Patent No. 6,208,976 discloses an order management system that enables a customer to ordering via a terminal device that can respond to changes and additions to a menu. When the system starts up, it transmits an operating program and image data from a main management system to each of the number of order taking terminal devices. However, the system is limited to only using the terminal for placing orders, the specifics regarding the power management and security of the terminal are not disclosed, the system only sends changes in the menu at system startup, not dynamically in real-time, and most importantly, does not address payment settlement.

Objects and Advantages

The invention disclosed henceforth aims to overcome many of the shortcomings of the prior art and presents the following objectives.

One of the objectives of the present invention is to implement or make use of hardware devices that are more suitable for food service establishments and that customers themselves can use to place orders wirelessly without staff intervention.

It is a further object of the present invention to provide a complete order processing solution, which addresses order placement, fulfillment, and payment settlement.

It is yet a further object of the present invention to provide a cost effective, reliable, and secure system that will make an establishment's operations more efficient.

It is still a further object of the present invention to provide a system which significantly reduces customer wait times and which improves customer service and the customer's overall experience at the food service establishments.

It is still a further object of the present invention to provide a system that alleviates labor shortage and increased labor costs.

It is an additional object of the present invention to provide a system which allows orders to be placed and paid for using either a fixed terminal or a mobile device and in which the mobile devices can include, but are not limited to, mobile telephones, PDA's or any other wireless device.

It is a further object of the present invention in a restaurant or similar setting to provide a system that identifies a particular person to be designated as an order or party leader and that provides said person with control and authorization over the party and the use of the system.

It is an additional object of the present invention to provide a system that provides tracking and security purposes for restaurants and the like.

It is still a further object of the present invention to provide the ability to handle both cash and cashless payments.

It is still a further object of the present invention to provide a system that facilitates the handling of discounts, coupons and promotions.

It is still a further object of the present invention to provide for the payment of food and drink orders via cashless payment mediums using a terminal or mobile device.

It is still a further object of the present invention in a restaurant or similar setting to provide for preordering of food and for browsing of menus using a guest terminal or a mobile device.

It is still a further object of the present invention in a restaurant or similar setting to facilitate automated seating including for optional seating at adjacent tables.

It is yet a further object of the present invention to provide a system that facilitates the order processing of food by splitting orders apart and redirecting items within each order to the appropriate staff or chef(s), and by grouping together similar items which are waiting to be processed.

It is still a further object of the present invention to provide a system that facilitates receipt processing via paper, email, or both.

It is still a further object of the present invention to provide the use of electronic tickets on mobile devices to identify customer, order, and payment information.

It is still a further object of the present invention to provide a version of the system that encompasses thin, touch-screen, wireless terminals, which can accept cashless payment mediums and operate on batteries alone, and an alternative version of the system that encompasses Internet-capable mobile devices.

It is still a further object of the present invention to provide a thin, wireless terminal that allows customers to browse the Internet and to obtain other information while they are dining or waiting for their orders.

It is still a further object of the present invention to facilitate dynamic selling whereby promotions and discounts on certain food items can be presented to customers in real-time.

It is still a further object of the present invention to provide a multi-lingual ordering interface in order to accommodate a more global customer base and to facilitate the ordering process when customers visit other countries.

These and other objects of the present invention will become apparent from a consideration of the ensuing summary, detailed description, and drawings.

Summary of the Invention

The present invention is a system and culmination of business methods that focus on improving the entire ordering process at food service establishments. This invention makes use of specially designed terminals and existing, Internet-capable, handheld mobile devices that allow customers to wirelessly place and pay for food/drink orders at food service establishments without requiring the intervention of a staff person. The present invention not only handles order placement and payment settlement, but also order fulfillment, and includes additional features, such as a multi-lingual interface, automated seating, pre-ordering, customer reward points, and dynamic selling or promotion of excess inventory.

In addition to being a cost-effective, reliable, secure system, the proposed invention greatly speeds up the entire ordering process, reduces customer wait times, increases the efficiency of establishments' operations, and improves customer service and the overall customer experience at food service establishments. Furthermore, the adoption of this technology will alleviate establishment owners' concerns over labor shortage and cost.

Customers will use either a terminal (described below) especially designed for use with the system, or their own Internet-capable, mobile device (e.g. a mobile phone or Personal Digital Assistant [PDA]). The customers' orders will be sent to the food service establishment's order-processing server directly (via a wireless local area network) or indirectly (through the Internet via the mobile device's provider and the system's support center). The establishment's server is connected to the system's support center by a high-speed connection to an Internet provider, which provides a virtual private network (VPN) between the establishment and the system support center. The system support center maintains a secure connection with a payment service provider to handle cashless payment transactions. All wireless transmissions containing sensitive data, such as payment information and special codes, will be encrypted. Furthermore, any sensitive data stored in the database or other storage medium will also be encrypted to ensure optimal security. Depending on the food service establishment type (store or restaurant) and the payment methods it accepts (cash or cashless), payment settlement for the order may take place before or after the order is accepted by the server for processing. After the order is prepared by the appropriate staff person at the establishment, it is presented to the customer who placed the order. This is the basic order processing logic, but as will be described in the section, entitled "Detailed Description of the

Preferred Embodiments", the order and steps vary depending on the implementation. The implementations vary depending on the ordering device (terminal or handheld, mobile device), establishment type (restaurant or store), and the payment mediums accepted (cash-and-cashless or cashless-only).

Terminals

The terminals are designed to be space saving, measuring less than two inches in thickness, and are able to function without the need for an electrical cord by using *not one*, but *two* rechargeable batteries. The terminals will provide touch-screen input and also include one or more communication components that will allow them to wirelessly connect via a wireless access point to a central server and other terminals located in the restaurant. A type of card-scanning component will be built into the terminals to allow processing of cashless payment mediums, including (but not limited to) debit cards, credit cards, smart cards, and pre-paid cards. One or more of the built-in communication components will include support for (but not limited to) infrared and Bluetooth technologies to allow the terminals to wirelessly accept payment information from another device (e.g. an electronic wallet or chip built into the customer's mobile device). This type of ultra-thin, dual battery-powered terminals, not present in previous inventions, will take up less (table) space, less of the customer's space, eliminate problems brought about by power cords, and allow customers to pay for their orders using a variety of cashless payment mediums.

As an additional feature (described in more detail below), depending on the system implementation (e.g. restaurant) and preferences of the establishment, customers may be able to access the Internet via the terminal during or after dining. The terminals will operate on (but not limited to) the open-source operating system Linux or its derivatives. This will eliminate the need to pay expensive licensing costs and thus significantly reduce the total cost of ownership of the entire system for establishment owners.

The establishment's server will be composed of two interconnected, ultra-thin computers or an appliance device that provides similar functionality. The reason for two computers (or similar device) is to provide fail-safe, fault tolerant redundancy, such that if one computer fails, the other will take over and ensure the uninterrupted functioning of the system. The computers (one being "primary" and the other one being "secondary") will be connected such that the primary server continuously replicates its data to the secondary server. If the primary server goes down (e.g. because of a disk or power supply failure), the secondary server will take over, resume processing, and become the new primary server. In the interim, the establishment and the system's support center will be immediately notified of the failure, and allow corrective action to be taken. This type of

redundancy, lacking in previous inventions, will ensure the smooth and continuous operations of the food service establishment.

Furthermore, because the server will be continuously connected to the system's support center, backups of the food service establishment's server can be made on a daily basis or at any varying time interval. This feature, not present in other types of ordering systems, ensures that the restaurant's critical data is backed up in event of an emergency (e.g. both of the server computers goes down, flood/water damage, earthquake, theft, etc.). Connectivity to the system's support center also allows for remote maintenance and software upgrades for both the server and the terminals. For example, if one of the terminals malfunctions, it is possible for the system's support center to immediately investigate and possibly fix the problem remotely within minutes of the problem occurring. This capability, not present in prior art, is critical for a food service establishment's system to be able to operate smoothly and with minimal downtime, if any at all, and to reassure establishment owners that there is a backup of their data and other critical information in the event of an catastrophe.

The food service establishment may load pictures and video into the system by using a digital camera or video camera. A special program may be used by the system to construct menus by asking the user which pictures/video should be associated with particular menu items. The establishment may also optionally contract the support center's services for uploading pictures and video on the establishment's behalf. Once pictures and/or video are loaded into the system, the files, along with any modifications of the menu text or program, which displays information to the customer, may be sent in real-time or at an appropriate time designated by the establishment to terminals needing the updated data. The entire system does not need to be restarted in order for the changes to take effect.

On the customer retention front, the system is capable of maintaining the customers' bonus or "reward points", which many food service establishments use to increase customer retention and to reward loyal, repeat customers with discounts and promotions. The more this system is adopted by a large number of food service establishments, the more customers will enjoy the benefit of having all their reward points consolidated and managed in a single place, and not have to carry a separate point card for each establishment.

Depending on the implementation (e.g. at a restaurant), upon logout, customers will also be given the option to submit their comments about the establishment, the service, and the quality of its menu items, which will provide extremely valuable feedback to the owner of the establishment on how to improve products and services for his/her customers. Also at logout, customers will be able to leave a tip, if the system or establishment has its preferences set to ask the customer if he/she

would like to leave a tip. The system can request the percentage or amount of tip to leave, as well as make a recommendation. This is important is because there is often confusion when to leave a tip and if so, how much, especially when traveling to other areas of the world, where tipping may vary. In some cultures, tipping is not necessary, in which case the system's preferences can be set such that a tip will not be asked for. This type of tipping functionality built into the system will certainly relieve any anxieties or confusion over tipping and make it easy for customers to automatically calculate the tip.

As mentioned above, if the terminal solution is being used at a restaurant or other seated establishment, then the customer may be able to access the Internet during or after the meal, depending on controls and options specified by the establishment's owner. For example, during high-traffic or busy times, Internet access time can be limited or restricted. However, in general, during slow times, the Internet access feature will allow friends, who are meeting at the restaurant for a meal or coffee, to enjoy "surfing" the Internet together (e.g. perhaps planning a trip, looking for apartments, movie, etc.). The customer may or may not be charged a slight fee for Internet access, in accordance with controls/options set forth by the restaurant and/or the system's support center.

However, it is possible that advertising by companies on the terminal or additional food/drink orders by the customer will negate the need to charge him/her for Internet access. Allowing customers to use the Internet while waiting for their orders to be fulfilled or after the meal while enjoying coffee and dessert will certainly enhance the customer's overall dining experience.

Once a customer places his/her order using the touch-screen terminal or his/her own mobile device and the order is sent to the server, depending on the items in the order and the establishment's system preferences, the server decides which items should be forwarded to the wait staffs' terminal(s) and which items should be forwarded to the chefs' terminal(s). For example, orders for drinks and salads can be forwarded to the wait staff terminals for processing, while only cooking-required orders are forwarded to the chefs' terminals. This introduces greater efficiencies and faster ordering processing by promoting division of labor.

Another process enhancement is to optionally group similar order items, which have yet to be processed, together in a form of batch processing. For example, in a restaurant, if orders for five (5) steaks are placed in the system, by five (5) different people at slightly different times, the system can group these five (5) steak items order together to be processed (cooked) simultaneously. This allows the chef to prepare and cook all of the steaks together, as opposed to a purely sequential order processing system that processes items in the order in which they were received. The advantage of this grouping logic over the sequential approach is that the chef does not have to bring out all of the cooking ingredients, supplies, and equipment to cook one steak, then put all of the

ingredients, supplies, and equipment away after finishing, and then have to bring out all of the same items again minutes later for another steak order (given that a different order item, i.e. pasta, was in the order queue between the two steaks).

To further facilitate order processing in establishments in which there are numerous chefs, each having a different specialty, each chef can optionally specify which items he/she can prepare. In that way, when the system receives particular order items, they will be forwarded to the chef who is able to prepare that particular order item. In the case, where the chef may be overburdened with order items, he/she has the option of redirecting or forwarding particular items to other chefs who are available. In addition, in the case where all chefs are capable of preparing the same items, the system can distribute the order items evenly among all the chefs, so that no one chef is overloaded with orders.

Furthermore, the system also makes use of messaging technology, as opposed to only using the traditional "request-reply" technology (most likely used by previous inventions), to send data (e.g. orders and other information) between the terminals (as well as mobile devices, if they are messaging-aware) and the server. The advantages of "messaging" over "request-reply" are numerous, but the most significant are 1) the terminals can send data to the server without having to wait for an immediate reply, which drastically improves the responsiveness of the customer's terminals, and 2) allows the server to send data to the terminals without the data being requested first. The significance of the latter is that message-based systems allow information to be "pushed" to terminals and messaging-aware mobile devices. This opens up a whole new opportunity, not possible before, for food service establishments to dynamically sell and promote items to its customers. For example, a messaging system would allow the establishment to notify all customers in the establishment (via the terminal or mobile device) that for the next ten (10) minutes, all drinks are half price, or the next three customers who order a steak dinner will receive a ten percent (10%) discount off their bill or a free dessert. This type of feature would allow establishments to offer promotions and discounts dynamically as a way to increase sales and reduce unwanted inventory. Also announcements that need to be made to all customers (e.g. last order, store closing in fifteen minutes, etc.) can be made via the messaging system, thus eliminating the need of busy wait-staff to walk around to and notify each customer.

In accordance with the present invention, herein is described an interactive system for controlling food ordering, processing, and payment at a food service establishment comprising: at least one wireless terminal or mobile device comprising data input means and screen for displaying text and/or multimedia files, which are wirelessly accessed from a central server and which correspond to menu items; at least one server for processing order transactions and data received from and sent to terminals or mobile devices; means for wirelessly transmitting order transactions

and data between server and terminals or mobile devices; means for tracking order information and payment status; and means for accepting payments for orders.

The interactive system additionally comprises a means for splitting orders apart and forwarding individual items within orders to the most appropriate staff person for handling the particular item; a means for grouping together items that have yet to be processed, allowing for batch preparation.

The interactive system additionally comprises a means for allowing customers to directly pay for orders via terminal or mobile device using cashless payment mediums, such as credit cards, debit cards, prepaid cards, smart cards, and mobile provider payment mechanisms; a means for processing discounts, coupons, and tips; a means for maintaining a customer's reward points; and a means for generating either a paper or electronic receipt that may be emailed to the customer.

The interactive system additionally comprises a means for allowing the menu items, displayed on the terminal or mobile device, to be updated in real-time.

The interactive system additionally comprises a means for adding menu items to an order via a mobile device by entering a code corresponding to a menu item.

The interactive system additionally comprises a means for dynamically selling menu items by which promotions for certain menu items are sent in real-time to the terminal or mobile device.

The interactive system additionally comprises a means for identifying the individual leader of a dining party who will pay for the meal and control ordering.

The interactive system additionally comprises a means by which a customer can peruse or pre-order menu items via a terminal or mobile device.

The interactive system additionally comprises a means for automatically providing seating information to customers via the terminal or a special seating device and allowing customers to seat themselves.

The interactive system additionally comprises a means by which the terminal may further include access to a global computer network (i.e. the Internet) such that the end user can access such items as Internet web pages, news, entertainment, and other information; a means by which the terminal may display information in different languages.

The interactive system additionally comprises a means by which customers may leave feedback for the establishment concerning quality of the menu items, service, etc.

In still a further embodiment, the invention is an interactive system for controlling food ordering, processing, and payment at a restaurant or similar food service establishment comprising: at least one terminal (affixed to a table), comprising a data input device including a touch-activated screen, or a mobile device, both capable of displaying text and multimedia data, which is accessible

from a central server and which corresponds to menu items; means for wirelessly transmitting a menu order to a central server which forwards items in an order to the terminal of an appropriate staff person of a food service establishment; means for identifying an individual leader of the dining party who is responsible for paying for the meal and controlling the ordering of menu items; means affixed to the terminal for accepting payment wherein said means accommodates credit cards, debit cards or other cashless payment systems; and means by which coupons and premiums can be offered and accepted by the system and tabulated into the final bill.

Allowing customers to pay and place for orders themselves using their own wireless mobile devices or establishment-owned wireless ordering terminals will greatly expedite the entire ordering process for the customer, allow an establishment to serve more customers quicker, focus more on customer service (rather than on order taking and payment settlement), and promote greater operating efficiencies.

Brief Description of the Drawings

FIG. 1.0.1 is a high-level overview of the system for food service establishments, given a restaurant scenario.

FIG. 1.0.2 is a high-level overview of the system for food service establishments, given a store scenario.

FIG. 2 is a network connectivity overview of the system where customers use terminals to place orders.

FIG. 3 is a network connectivity overview of the system where customers use mobile devices to place orders.

FIG. 4.1 is a diagram depicting the front and side external views of the terminal.

FIG. 4.2 is a diagram depicting the top, bottom, and back external views of the terminal.

FIG. 5 is a diagram depicting the internal (components) view of the terminal.

FIG. 6.1.1.1 is a diagram depicting the process logic of the terminal solution for restaurants accepting both cash and cashless payment mediums.

FIG. 6.1.2.1 is a diagram depicting the process logic for the terminal solution for restaurants accepting cashless payment mediums only.

FIG. 6.1.3.1 is a diagram depicting sample screen shots of the terminal solution at a restaurant.

FIG. 6.2.1.1 is a diagram depicting the process logic of the terminal solution for stores accepting cash and cashless payment mediums.

FIG. 6.2.2.1 is a diagram depicting the process logic of the terminal solution for stores using cashless payment mediums only.

FIG. 6.2.3.1 is a diagram depicting sample screen shots of the terminal solution at a store.

FIG. 7.1.1.1 is a diagram depicting the process logic of the mobile device solution for restaurants accepting both cash and cashless payment mediums.

FIG. 7.1.2.1 is a diagram depicting the process logic of the mobile device solution for restaurants accepting cashless payment mediums only.

FIG. 7.1.3.1 is a diagram depicting sample screen shots of the mobile device solution at a restaurant.

FIG. 7.2.1.1 is a diagram depicting the process logic of the mobile device solution for stores accepting cash and cashless payment mediums.

FIG. 7.2.2.1 is a diagram depicting the process logic of the mobile device solution for stores that accept cashless payment mediums only.

FIG. 7.2.3.1 is a diagram depicting sample screen shots of the mobile device solution at a store.

FIG. 7.3.1 is a diagram depicting the system login and registration process logic for mobile devices.

FIG. 7.3.2 is a diagram depicting the establishment login process logic for mobile devices.

FIG. 8.1.1.1 is a diagram depicting the payment settlement logic for restaurants accepting cash and cashless payment mediums.

FIG. 8.1.2.1 is a diagram depicting the payment settlement logic for restaurants accepting cashless payment mediums only.

FIG. 8.1.3.1 is a diagram depicting the automated seating logic for restaurants.

FIG. 8.1.3.2 is a diagram depicting the customer information input process logic, which is used primarily by FIG. 8.1.3.1 in the automated seating process logic, for restaurants.

FIG. 8.1.3.4 is a diagram depicting the logout logic for restaurants.

FIG. 8.1.3.5 is a diagram depicting the browsing/pre-ordering process logic for restaurants.

FIG. 8.3.1 serves as the core order processing logic that all implementations share, regardless of establishment (restaurant or store), device type (terminal or mobile device), and payment method (cash-and-cashless or cashless only).

FIG. 8.3.2 is a diagram depicting the receipt specification process logic.

FIG. 8.3.3 is a diagram depicting the discount (or promotion) and rewards points process logic.

FIG. 8.3.4 is a diagram depicting the process logic for updating a customer's reward points.

FIG. 8.3.5 is a diagram depicting the process logic of the dynamic selling feature of the system.

Detailed Description of the Preferred Embodiments

The present invention is described with reference to the enclosed Figures wherein the same numbers are utilized where applicable.

FIG. 1.0.1 is a high-level overview of the system for food service establishments, given a restaurant scenario. Food service establishment customers may either use their own mobile devices [5,15] or a wireless ordering terminal [100] to place and pay for their food or drink order, without the intervention of the establishment's staff.

In the scenario in which customers use their own mobile devices [5], customer and order information is sent wirelessly via the customer's Wireless Internet Access Provider or Mobile Phone Gateway [20], and then sent via the Internet [30] to the System Support Center [40]. After the order

is processed, it is sent again via the Internet [30] to the Food Service Establishment's server [50]. At this point, the order is processed and depending on the items in the order, the order (or part of the order) is forwarded to the worker terminal(s) used by the staff and (or) the chef(s) [101]. At each point in the process of the handling of the order by the staff or chef(s), the order information is updated on the Establishment's Server [50] using any of the worker terminals [101], and sent back via the Internet [30] to the System Support Center [40]. At this point, customers may use their mobile devices [5] to see the status of their orders, see the bill total, etc. When the order is ready, the establishment's staff will then bring the order (or parts of the order) to the customers. Depending on the type of payment used (i.e. credit card or pre-paid card), customers may also pay for the order wirelessly via their mobile device [5]. In this case, payment verification is carried out via the Payment Service Provider [45]. All sensitive data is encrypted or sent using a secure protocol.

In the case where customers use the wireless ordering terminal [100] or a mobile device capable of wirelessly connecting to a local area network [15], customer and order information can be sent directly via a wireless local area network to the Food Service Establishment's in-house server [50]. At this point, customer and order information is forwarded via the Internet [30] to the System Support Center [40] for any necessary processing or backup. Order information is also sent wirelessly to the worker terminal(s) of the staff and (or) the chef(s) [101]. At each point in the process of the handling of the order by the staff or chef(s), the order information is updated on the Establishment's Server [50] via any of the worker terminals [101]. The order information and its status are sent to both the System Support Center [40] via the Internet [30] and to the customers' wireless ordering terminal [100] or mobile device [15] via the local wireless network. At this point, as before, customers may use their wireless ordering terminal [100] or mobile device [15] to see the status of their orders, see the bill total, etc. When the order is ready, the establishment's staff will then bring the order (or parts of the order) to the customers. Depending on the type of payment used (i.e. credit card or pre-paid card), customers may also pay for the order wirelessly via the wireless ordering terminal [100] or their own mobile device [15]. In this case, payment verification is carried out via the Payment Service Provider [45]. All sensitive data is encrypted or sent using a secure protocol.

FIG. 1.0.2 is a high-level overview of the system for food service establishments, given a store scenario. Food service establishment customers may either use their own mobile devices [5,15] or a wireless ordering terminal [100] to place and pay for their food or drink order, without the intervention of the establishment's staff.

In the scenario in which customers use their own mobile devices [5], customer and order information is sent wirelessly to the customer's Wireless Internet Access Provider or Mobile Phone Gateway [20], and then sent via the Internet [30] to the System Support Center [40]. After the order is processed at System Support Center [40], the order is sent via the Internet [30] to the Food Service Establishment's server [50]. At this point, the order is processed and forwarded to the

worker terminal(s) used by the staff [101]. At each point in the process of the handling of the order by the staff, the order information is updated on the Establishment's Server [50] using any of the worker terminals [101], and sent back via the Internet [30] to the System Support Center [40]. At this point, customers may use their mobile devices [5] to see the status of their orders, see the bill total, etc. When the order is ready, the establishment's staff will then give the order to the customers at the Order Pickup Counter [70]. Depending on the type of payment used (i.e. credit card or pre-paid card), customers would have been able to pay for their order previously, upon order placement, using their mobile device [5]. In this case, payment verification would have been carried out via the Payment Service Provider [45]. All sensitive data is encrypted or sent using a secure protocol.

In the case where customers use the wireless ordering terminal [100] at the Order Placement Counter [60] or a mobile device capable of wirelessly connecting to a local area network [15], customer and order information can be sent directly via a wireless local area network to the Food Service Establishment's in-house server [50]. At this point, customer and order information is forwarded via the Internet [30] to the System Support Center [40] for any necessary processing or backup. Order information is also sent wirelessly to the worker terminal(s) [101]. At each point in the process of the handling of the order by the staff, the order information is updated on the Establishment's Server [50] via any of the worker terminals [101]. The order information and its status are sent to the System Support Center [40] via the Internet [30] and to the customers' mobile device [15] via the local wireless network. Those who used the wireless ordering terminal [100] to place and pay for their order would have received a physical ticket or receipt since they do not have a mobile device to receive order status. When the order is ready, customers may pick up their order at the Order Pickup Counter [70]. Depending on the type of payment used (i.e. credit card or pre-paid card), customers would have been able to pay for their order previously, upon order placement, using their mobile device [15] or the wireless ordering terminal [100]. In this case, payment verification would have been carried out via the Payment Service Provider [45]. All sensitive data is encrypted or sent using a secure protocol.

FIG. 2 is a network connectivity overview of the system where customers use terminals to place orders. The Terminals [100], the Establishment Server [400], and the Wireless Access Point and Router Device [500] are located within the food service establishment. The Terminals [100] are currently connected to the Wireless Access Point and Router Device [500] by, but not limited to, an 802.11 wireless connection [505]. The Establishment Server [400] is currently connected to the Wireless Access Point and Router Device [500] by, but not limited to, an Ethernet connection [510]. The Wireless Access Point and Router Device [500] is currently connected to a High-Speed Internet Access Provider (ISP) [600] via, but not limited to, a wired, broadband connection [520]. The broadband connection [520] provides both an Internet connection [540] to the Internet [800], and a Virtual Private Network (VPN) connection [560] to the System Support Center [700]. Note that the diagram depicts the scenario in which the Establishment Server [400] and the System Support

Center [700] are connected to the same ISP [600]. However, it is highly possible that the establishment's and the System Support Center's ISP will be different. In this case, the Establishment Server [400] and the System Support Center [700] can still be connected via a secure VPN connection since the VPN settings are configured in both parties' router. In order to process payment transactions, the System Support Center [700] is connected via a VPN or other secure connection [740] to the Payment Service Provider [750].

FIG. 3 is a network connectivity overview of the system where customers use wireless mobile devices to place orders. As shown, the Mobile Devices [900] (e.g. mobile phones and PDA's), the Establishment Server [400], and the Wireless Access Point and Router Device [500] are located within the dining establishment. The Mobile Devices [900] currently interact with the Establishment Server by, but not limited to, either a Mobile Phone Gateway Provider [620] or a Wireless Internet Access Provider [640], which connect via the Internet [800] to the System Support Center [700], which, in turn, securely connects to the Establishment Server [400]. For security reasons, this is the preferred method for wireless, Mobile Devices [900] to connect to the Establishment Server [400]. However, it may also be possible for Mobile Devices [900] to directly connect to the Establishment Server [400] over a local wireless connection via the Wireless Access Point and Router Device [500]. The Establishment Server [400] is currently connected to the Wireless Access Point and Router Device [500] by, but not limited to, an Ethernet connection [510]. The Wireless Access Point and Router Device [500] is currently connected to a High-Speed Internet Access Provider [600] via, but not limited to, a wired, broadband connection [520]. The broadband connection [520] provides both an Internet connection [540] to the Internet [800], and a Virtual Private Network (VPN) connection [560] to the System Support Center [700]. Note that the diagram depicts the scenario in which the Establishment Server [400] and the System Support Center [700] are connected to the same ISP [600]. However, it is highly possible that the establishment's and the System Support Center's ISP will be different. In this case, the Establishment Server [400] and the System Support Center [700] can still be connected via a secure VPN connection since the VPN settings are configured in both parties' router. In order to process payment transactions, the System Support Center [700] is connected via a VPN or other secure connection [740] to the Payment Service Provider [750].

FIG. 4.1 illustrates the front and side external views of the terminal. Looking at the front view [500] of the terminal [2], there is an ultra-thin, touch-screen display panel [4]; speakers [14] for audio output; a miniature microphone [12] for audio input; and an IrDA [64] or similar technology for short-range wireless infrared communications with other devices that support IrDA or similar technology. There are several user controls on the right side of the panel, such as a knob for controlling the screen's brightness [160], a knob for adjusting the volume [150], a knob for scrolling (i.e. for web

pages) [140], a button for returning to the previously viewed screen/web page [142], and a button for jumping ahead to a screen or web page that is next to be viewed in the sequence [144]. At the top of the terminal is battery 1's un/locking mechanism [170] and battery 2's un/locking mechanism [220], which allow the device to be used securely without concern for a customer removing one or both of the batteries powering the terminal. On the left side, although not actually visible from the front view, the approximate location of the payment card bay [24], where the customer's payment card will be placed, is faintly displayed.

The left side view [510] of the terminal [2] shows part of the ultra-thin, touch-screen display panel (since it is really embedded inside of the terminal, as depicted by the perforated lines) [4] and battery 2's un/locking mechanism [220], in addition to the terminal's back mounting plate [6]. The mounting plate [6] allows the terminal to be affixed to almost any type of apparatus for securely holding the terminal. In addition, the payment card slot [22], where the customer inserts his/her payment card, and a payment card slot finger groove [28], which aids the customer in retrieving his/her card from the slot is displayed. There is also a control panel cover [36], which securely hides the buttons for performing certain functions with the terminal. The control panel un/locking mechanism [30], when unlocked, the control panel cover un/locking mechanism blocking piece [32] is moved to the right such that it no longer interlocks with the control panel cover block piece [34]. The control panel cover [36] is then capable of being slid down into the control panel sliding area [38], thus revealing the control panel. This type of security mechanism is necessary in a food service establishment environment, so that the terminals controls and settings are not capable of being accessed nor changed.

The right side view [520] of the terminal [2] displays part of the ultra-thin, touch-screen display panel [4], battery 1's un/locking mechanism [170], and the terminal's back mounting plate [6]. In addition, the screen brightness control [160], the volume control [150], the screen scrolling control [140], the screen back navigation control [142], and the screen forward navigation control [144] are also visible.

FIG. 4.2 illustrates the top, bottom, and back external views of the terminal. From the top view [530], battery 1's un/locking mechanism [170], battery 2's un/locking mechanism [220], battery 1's sliding cover [190] and battery 2's sliding cover [240] are clearly visible. As before, part of the ultra-thin, touch-screen [4], the control panel un/locking mechanism [30], the screen brightness control [160], and the terminal's back mounting plate [6] can be seen.

From the bottom view [540], as before, part of the ultra-thin, touch-screen [4], the payment card eject button [20], the screen scrolling control [140], and the terminal's back mounting plate [6]

are shown. This time, the fan vent [340], which is provided to allow hot air to be blown out of the terminal by its internal fan, is also visible.

Many components described above can again be seen in the back view [500], but they have been omitted here for brevity. The power cord socket [130], which allows the terminal to be connected to a traditional power outlet, is shown. Note that this will most likely not be used in the customer setting, as the cord can be easily removed. As such, the power cord socket will most likely be used for the terminals belonging to the establishment's staff. There are also heating vents [342], which allow another route for heat, generated inside of the terminal, to escape. The terminal's back mounting plate [6], which is supported by back mounting plate support pieces [8], have fastening holes [10], in which screws or other similar objects can be inserted, to securely mount the terminal to an apparatus for holding the terminal. As an added security measure, a security lock [350] is also built into the terminal, to securely connect the terminal to an object in the establishment that is static and not (easily capable of being) moved (i.e. a table). The security lock works very similar to those made available on many of today's computing devices. The security cable goes into the security lock opening 1 [352], goes underneath the security lock metal holding piece [354], and comes out of the security lock opening 2 [356]. Then a standard lock can be placed on the end of the security cable (not displayed) to prevent the cable from being removed from the terminal's security lock [350].

As can be interpreted from the explanations of the various external views of the terminal, it is securely designed to be used in a food service establishment environment without concern for theft or changing certain terminal settings.

FIG. 5 is a diagram depicting the internal view of the terminal. A motherboard [105], which maintains connections to all its complimenting components, is contained in the terminal. Attached to the motherboard, is a central processing unit (CPU) [100], a small power supply [120], memory slot(s) [90], Universal Serial Bus (USB) slot(s) [110], a graphics chip [80], an audio chip [85], a micro hard drive or similar storage medium (for storing data) [70], a fan (for removing heat from the terminal) [330], a wireless communications chip (most likely, but not limited to, Bluetooth) [60], and an IrDA (Infrared) or comparable chip [65].

Unique to the terminal of the present invention is a payment card reader [26], which is capable of reading both magnetic stripe cards and smart cards with an embedded microchip. As a result, the terminal is capable of reading payment cards that are in heavy use today, such as debit, credit, and pre-paid cards, but also payment cards, namely smart cards, which are anticipated to be in wide use in the future. Information is read from the payment cards with the assistance of a payment card processing chip [50]. Once a customer inserts his/her card into the payment card slot

(FIG. 4: Side View [510]: Part 22) and into the payment card loading bay [24], the payment card will automatically be loaded into the payment card reader [26]. The customer may eject his/her card by pressing the payment card eject button [20]. Also, the terminal may automatically eject the customer's card based on certain conditions (i.e. logging out).

The terminal also contains an optional PCMCIA card slot [55], which may be replaced by a simple 802.11 wireless communications chip or similar, if it is determined that the PCMCIA card slot weighs too much, is costly, etc. However, the preferred embodiment is to have a PCMCIA card slot, which will allow future expandability when PCMCIA cards are released for wireless technologies not yet known.

The other feature unique to this terminal is that, in its preferred embodiment, it supports not one (1), but two (2), rechargeable batteries. The reason for this is that in a food service establishment setting, it is not feasible to use power cords connected to an electrical socket. Power cords are intrusive to the customer and have a high probability of being accidentally dislodged or even stolen. Also, most food service establishments, especially restaurants, do not have many electrical sockets where the customers are sitting. Given this, power cords are not a viable deployment option. And although the life of rechargeable batteries are increasing, they still do not last very long when the wireless communications feature/component is used frequently. In addition, viewing images and video, listening to audio, looking at menu items, and "surfing" the Internet, will all drastically wear away battery life. As such, to enable continuous operation of the terminal, without having to shutdown the terminal while the customer is using it, the terminal employs a dual-battery approach. With this feature, it is possible for the establishment's staff to change one battery while the other one powers the terminal. In this way, the customer is not inconvenience and may continue using the terminal uninterrupted.

A typical computing device does not offer security for the rechargeable battery because the device is usually only handled by its owner. However, in a public setting, it is critical to implement a locking mechanism so that the battery cannot be stolen nor accidentally removed. As a result, the terminal implements a security feature that only allows the establishment's staff access to the batteries. In the diagram, the security mechanism for the battery functions exactly the same for battery 1 [214] and battery 2 [264]. Although unique identification numbers have been provided for the same parts on both batteries, for brevity purposes, only the security mechanism for battery 1 will be described. For reference purposes though, a table has been provided below to indicate which identification numbers of battery 1's components correspond to those on battery 2.

Battery 1	Battery 2	Component
170	220	Battery Un/Locking Mechanism

180	230	Battery Un/Locking Mechanism Hook
182	232	Battery Un/Locking Mechanism Hook Blocking Piece
185	235	Battery Un/Locking Mechanism Cavity
190	240	Battery Sliding Cover
200	250	Battery Sliding Cover Finger Groove
202	262	Battery Sliding Cover Blocking Piece
210	260	Battery Sliding Cover Stopper
212	262	Battery Cavity
214	264	Battery
216	266	Battery Handle Grooves

When a wait staff member inserts his/her key into the battery un/locking mechanism [170] and turns, it forces the battery un/locking mechanism hook [180] downward into the battery un/locking mechanism cavity [185]. As this occurs, the battery un/locking mechanism hook blocking piece [182] also moves down and no longer is meshed with the battery sliding cover blocking piece [202]. Since this later component is free to move, the staff person may open the battery cavity [212] by placing his/her finger into the battery sliding cover finger groove [200] and sliding the battery sliding cover [190] until it reaches the battery sliding cover stopper [210]. The staff person may then lift the battery [214] by its battery handle grooves [216] out of the battery cavity [212]. As mentioned earlier, the terminal will continue to function without interruption so long as the other battery, which is still plugged into the terminal, has power. The staff person may then recharge the removed, power-depleted battery in its battery recharging rack [FIG. 1.1:300] and return it to the terminal after the battery has been recharged. In order to close the battery cavity [212], the staff person simply needs to return the battery sliding cover [190] to its original position and turn the special key, still inserted into the battery un/locking mechanism [170], the opposite way. This will return the battery un/locking mechanism hook [180] and the battery un/locking mechanism hook blocking piece [182] to its original position, meshing with the battery sliding cover blocking piece [202] and preventing the battery sliding cover [190] from moving.

Another security feature is the USB slot(s) un/locking mechanism [280] for protecting the USB ports from unauthorized use. In order to gain access to the USB slot(s), the staff person uses the same key and inserts it into the USB slot(s) un/locking mechanism [280]. Upon turning the key in a counter-clockwise direction, the USB slot(s) un/locking mechanism blocking piece [290] rotates downward and no longer keeps the USB slot(s) blocking piece [300] in place. As such, the staff person may then slide the USB slot(s) cover [310] to the left into the USB slot(s) cover sliding area [320] and gain access to the USB slot(s).

There is also a control panel un/locking mechanism [30], which functions identical to the USB slot(s) un/locking mechanism [280]. Inserting the same key use previously, the staff person is able to open the control panel cover [FIG. 4: Side View 510: Part 36]. The control panel [40] inside has 3 buttons. One is the on/off button [42] for the terminal; the second is the terminal display settings button [44], and the third is a generic button [46] for future-use.

As can be interpreted from the preceding description, the terminal has been designed with unique security and dual-battery features that make it optimal for use in a food service establishment setting.

FIG. 6.1.1.1 depicts the process logic of the terminal solution for restaurants accepting both cash and cashless payment mediums. As shown, the process begins by the party entering the establishment [10]. The term "party" is used for consistency purposes, whether there are several customers in the party or only one. Depending on the preferences of the owners of the establishment, they may choose to use or not use the automated seating system [15], which would allow customers to seat themselves, expedite the entire ordering process, and save on labor costs for the establishment. If the establishment is using the automated seating system [15:yes], then the logic would proceed as described in FIG. 8.1.3.1 [25] and later resume with the party proceeding to their table(s) [220]. However, if the establishment is not using the automated seating system [15:no], then a staff person would need to ask the party leader for his/her name, the number of people in his/her party, and the party's smoking preference [30].

The party leader's name and the visit code (described below) are used together as a secure way of logging into the ordering system. In addition, the party leader's name serves as a type of "party/group name", to tie members of the same party together, particularly when the party is spread across different tables or using different terminals to order. It is to be noted that the party leader may also present his/her name to the staff person by using his/her cashless payment medium that contains a readable name, or by using a card which is especially designed for use with this system (if such a card becomes available).

The staff person then inputs the customer's name, party count, and smoking preference into the system [40]. Upon entering the information, the system will then generate a "visit code" for the party [50]. A "visit code" is a randomly generated code, composed of numbers and letters, and is used to uniquely identify the customer's party during their visit to the establishment. The visit code is valid from the time it is generated until the customer's party has logged out and their bill has been paid. As such, the visit code also serves in part as a security mechanism to ensure that the customer is physically in the establishment before placing orders. This is especially important in

establishments that accept cash payment from customers at the end of the meal and that allow orders to be placed via a mobile device. The reason being that without some type of randomly generated code, which is only valid while the party are ordering at the restaurant, it would be possible for an individual outside the restaurant to place "prank" orders via his/her mobile device. Furthermore, the visit code is only activated once a table is available for the customer.

The staff person then prints out a slip containing the visit code and a bar code, and gives it to the party leader [60]. The slip can also be automatically printed out and dispensed by the system after the visit code has been generated in step 50. The staff person will then check to see if a table is available [70]. If a table is available [70:yes], then the staff person will activate the party's visit code for a particular table (or tables) [210] and then tell the party their table number or show the party to their table [215]. The party then proceeds to their table [220]. If a table is not available [70:no], then the party can see if a "guest terminal" is available in the waiting area [80]. A "guest terminal" is the same type of ordering terminal that is available at a customer's table. However, it is used primarily for browsing and pre-ordering available menu items. Since the customer and his/her party has not been seated yet, nor their visit code activated, pre-ordered items will not be sent to the kitchen for processing, but rather stored temporarily and allowed to be retrieved later upon being seated.

If the establishment provides a guest terminal in the waiting area [80:yes], then whether the party will be able to use it depends on whether there are other customers in the waiting area using the terminal [90]. When there are no other customers using the terminal in the waiting area [90:no], then the party may proceed to use the terminal to browse or pre-order items [180], as described in FIG. 8.1.3.5. When a table becomes available, the staff person retrieves the party's information from the system [200]. It is possible for the establishment to specify that the system automatically display, on the staffs' terminal, the information of the party for whom a table has become available.

If the party is still present (e.g. has not left the establishment), then the staff person will activate the party's visit code for the particular table(s) [210], which have been assigned to the party. The staff person then directs the party their table [215], and the party proceeds to their table [220].

In the case that there is no guest terminal in the waiting area [80:no] or there is a guest terminal, but it is in use by a different customer [90:yes], then it may be possible for the members of the waiting party to browse or pre-order depending on whether a member has a mobile device (e.g. mobile phone, PDA, etc.) [150].

If none of the party members have a mobile device [150:no], then the party must simply wait [160] until notified by a staff person that a table is available. However, in the event the a party

member does have a mobile device [150:yes], then he/she may browse or pre-order [180], in accordance with the logic described in FIG. 8.1.3.5. When a table becomes available for the party, the staff person then retrieves the party's information from the system [200]. As previously mentioned, the system may also automatically display the information of the party for whom a table is available. Then the staff person will activate the party's visit code for the available table(s) [210], and tell/show the party their table(s) [215]. The party then proceeds to the table [220].

Once the party has been seated at the table, the party leader selects his/her language preference [225], if the system and establishment are configured to display the terminal's screens in languages other than the primary language of the country where the establishment is located. The party leader then inputs his/her name and visit code into the terminal to login [230]. Since it is possible for one party to use several terminals, in the situation where the party uses two or more tables, the system needs to check whether or not the person logging in is the party leader or not [240]. In the event a party uses two or more tables and thus terminals (assuming there is one terminal per table), other members of the party can log into a terminal using the party's visit code, but must specify the party leader's name in addition to their own unique name. It is important to note that once the party leader has logged in, it is not possible for anyone else to log in with the same name and visit code. Non-party leader members will be able to add items to the order, as presented in FIG. 8.3.1, but he/she will not be able to place the order. The party leader will need to confirm the member's order [FIG 8.3.1:104-106], unless the leader specifies that the member is a trusted orderer, in which case the member will also then be able to directly place orders.

If the customer logging in is indeed the party leader [240:yes], then he/she may proceed to select the method of payment for the meal [270]. Otherwise, if the customer logging in is not the party leader, but rather another member of the party [240:no], then the system checks whether or not the establishment allows each customer to pay separately or not [250].

Not all establishments allow customers in a party to pay separately, regardless of whether the payment would be made in cash or by some form of cashless payment medium. This is a heuristic to be decided upon by the establishment. If the establishment does not allow customers of the same party to pay separately [250:no], then the party member logging in does not specify a payment method and continues to complete any other login procedures [320]. On the other hand, if the establishment does allow customers of the same party to pay separately [250:yes], then the party member, as the party leader did above, proceeds to select his/her method of payment [270].

Given that the method of payment is cash [280:cash], then the customer continues to complete the other login procedures [320]. However, if the customer is using a cashless payment medium [280:cashless], then he/she must swipe, input, or transfer his/her cashless payment

medium into the terminal [290]. If the establishment is using the specially designed terminal, which includes a slot for swiping or inputting a cashless payment medium, then the customer can simply swipe or input his/her medium (e.g. credit card, debit card, smart card, etc.) into the terminal. Other mediums, such as a type of electronic wallet built into a customer's mobile device (e.g. mobile phone or PDA), can wirelessly transmit the payment information (via the mobile device's preferred transmission method, such as infrared or Bluetooth) to the terminal. However, if a generic terminal is used that does not support the payment mechanism like the specially designed terminal, the customer must type the necessary payment medium information directly into the terminal via the terminal's touch-screen.

It is up to the establishment to ask the customer for the payment information upon login or upon logout (after step 350, which describes the logout logic [FIG. 8.1.3.4]). However, the preferred embodiment is to ask the customer for the method of payment upon login, and encourage or provide incentives to the customer to pay by a cashless payment medium. The cashless payment medium will expedite the entire customer visit by not requiring the establishment to allocate staff time to collecting payment after the meal. Also, collecting the customer's payment information in advance ensures that a customer will not leave the restaurant without paying and that prank orders are not placed. Furthermore, in the not too distant future when the system is only cashless-based, as described in FIG. 6.1.1.2, the customer will be accustomed to entering the payment information in advance.

The system then validates the customer's cashless payment medium to ensure that it is an acceptable payment medium [300]. If the medium is not accepted [310:no], then the customer is prompted to try the medium again or use a different medium, and steps 290-310 are repeated again. Although not explicitly depicted in FIG. 6.1.1.1, it is possible for the customer to opt to pay in cash if their cashless payment medium has not been accepted and they have no other cashless payment medium. If the medium is accepted though [310:yes], then the customer proceeds to complete the other login procedures [320].

Once the customer has completed the other login procedures, he/she enters any discount or promotion code that he/she may have, in addition to seeing if he/she qualifies for loyalty/appreciation rewards [325], as detailed in FIG. 8.3.3. The customer then selects the order menu on the terminal [330], and places orders [340] in accordance with the Order Processing Logic in FIG. 8.3.1. Upon completing all ordering, the customer logs out of the system [350], as described in the Restaurant Logout Logic in FIG. 8.1.3.4. After completing the logout procedures, the party then pays for their bill and/or picks up the receipt at the establishment's checkout counter [360], as explained in the Payment Settlement Logic of FIG. 8.1.1.1. Once the meal has been paid for and the party receives their receipt, if one was specified, the party may then leave the establishment [370].

Referring now to FIG. 6.1.2.1, a diagram depicting the process logic for the terminal solution for restaurants accepting cashless payment mediums only is shown. The process begins by the party entering the establishment [10]. Depending on the preferences of the owners of the establishment, they may choose to use or not use the automated seating system [20], which would allow customers to seat themselves, expedite the entire ordering process, and save on labor costs for the establishment. If the establishment is using the automated seating system [20:yes], then the logic would proceed as described in FIG. 8.1.3.1 [30] and later resume with the party proceeding to the table [230]. However, if the establishment is not using the automated seating system [20:no], then a staff person would need to ask the party for the number of people in the party and their smoking preference [40]. After inputting the party's information into the system [50], one of the party members (henceforth, referred to as "party leader") would then need to select (on the terminal at the entrance of the establishment) the type of cashless payment medium he/she is using (e.g. credit card, debit card, smart card, pre-paid card, electronic wallet, etc.) [58]. Next, the party leader inputs or transfers his/her cashless payment medium information to the terminal [60]. In the event that the party leader is using a pre-paid card or other cashless payment medium for which the name cannot be discerned, the system will prompt the party leader to enter his/her name.

The party leader's cashless payment medium will then be verified [65]. Although not noted in the figure, if the medium is not accepted, the party leader will be prompted to try a different medium. Otherwise, if the cashless payment medium is accepted, the logic continues as listed.

If a table is available [70:yes], then the staff person will activate a particular table or tables (and associated terminals) for use by the party [210], and then tell the party their table number(s) or show the party to their table [220]. The party then proceeds to their table [230]. If a table is not available [70:no], then the party can see if a "guest terminal" is available in the waiting area [80].

If the establishment provides a guest terminal in the waiting area [80:yes], then whether the party will be able to use it depends on whether there are other customers in the waiting area using the terminal [90]. When there are no other customers using the terminal in the waiting area [90:no], then the party may browse/pre-order items [170] in accordance with the logic in FIG. 8.1.3.5. When a table becomes available, the staff person retrieves the party's information from the system [200].

It is possible for the establishment to specify that the system automatically display, on the staffs' terminal, the information of the party for whom a table has become available. If the party is still present (i.e. has not left the establishment), then the staff person will activate a particular table or

tables for the party [210]. The staff person directs the party to their table(s) [220], and the party proceeds to the table(s) [230].

In the case that there is no guest terminal in the waiting area [80:no] or there is a guest terminal, but it is in use by other customers [90:yes], then it may be possible for the party to browse or pre-order depending on whether the any party members have a mobile device (e.g. mobile phone, PDA, etc.) [150]. If none of the party members have a mobile device [150:no], then the party must simply wait [160] until notified by a staff person that a table is available. However, in the event one of the party members does have a mobile device [150:yes], then he/she may browse/pre-order [170] as specified in FIG. 8.1.3.5.

When a table (or tables) becomes available for the party, the staff person then retrieves the party's information from the system [200]. As previously mentioned, the system may also automatically display the information of the party for whom a table (or tables) is available. Then the staff person will activate the available table(s) (and associated terminals) for use by the party [210], and tell or show the party their table [220]. The party then proceeds to the table [230].

Once the party has been seated at their table(s), the party leader once again selects on the terminal his/her language preference [235], if the system and establishment are configured to display the terminal's screens in languages other than the primary language of the country where the establishment is located. The party leader also selects the type of cashless payment medium [240] that was specified upon entering the establishment (in Step 58). Next, the party leader inputs/swipes (e.g. card-based medium) or transfers (e.g. electronic-based medium) his/her cashless payment information to the terminal [250]. The party leader must use the same cashless payment medium that was used upon entering the establishment.

Since it is possible for one party to be seated at two or more tables and use several terminals (e.g. one at each table), then the party members at the other tables may log into the system using their own cashless payment medium. However, the party leader will need to approve the other member's login to ensure that the table and terminal are being used by a recognized member of his/her party and not by non-affiliated customers.

Once the party leader has logged into the terminal, then a check must be performed as to whether the establishment allows members within the same party to pay separately [260]. If forbidden [260:no], then the party leader simply continues with the other login procedures [310]. However, if the establishment allows party members to pay separately [260:yes], then the party leader will be asked if any other members would like to pay separately [270]. If no one else wants to pay separately [270:no], then the party leader continues to complete the other login procedures [310]. But if there are party members who do wish to pay separately [270:yes], each paying

member must 1) select the type of the cashless payment medium he/she will use [278] and input/transfer the medium (or its information) in/to the terminal [280]. The member's cashless payment medium must then be validated by the system [290]. If it's not accepted [300:no], then the member will be given the opportunity to cancel (not depicted in figure) or try again by completing steps 278-290 again. If the party member's cashless payment medium is accepted [300:yes], then the terminal will ask if any others wish to pay separately. If yes [270:yes], steps 278-300 will repeat. Otherwise [270:no], the party leader will continue with any other necessary login procedures [310].

Once the party leader has completed the other login procedures, he/she enters any discount or promotion code that he/she may have, in addition to seeing if he/she qualifies for loyalty/appreciation rewards [315], as detailed in FIG. 8.3.3. The customer then selects the order menu on the terminal [320], and places orders [330] in accordance with the Order Processing Logic in FIG. 8.3.1. Upon completing all ordering, the party leader logs out of the system [340], as described in the Restaurant Logout Logic in FIG. 8.1.3.4. After completing the logout procedures, the bill is then charged to the party leader's (and other paying member's) cashless payment medium [350], as detailed in FIG. 8.1.2.1. The party may then leave the establishment [360].

FIG. 6.1.3.1 is a diagram depicting sample screen shots of the terminal solution at a restaurant. The various parts of the screen are not described, as they may change slightly, and as this diagram is provided more to lend visual support to the proceeding process logic diagrams of what the customer most likely will see.

FIG. 6.2.1.1 is a diagram depicting the process logic of the terminal solution for stores accepting cash and cashless payment mediums. The process begins by the customer entering the establishment [10] and proceeding to the terminal to use for ordering [20]. First, the customer selects his/her language preference [22], if the system and establishment are configured to display the terminal's screens in languages other than the primary language of the country where the establishment is located. Next, before ordering, the customer enters any discount or promotion code that he/she may have, in addition to seeing if he/she qualifies for loyalty/appreciation rewards [25], as detailed in FIG. 8.3.3. Then, after the customer has selected all of the items to add to his/her order [30], in accordance with the Order Processing Logic in FIG. 8.3.1:steps 25-100, he/she then selects his/her method of payment [40]. If the customer selects the cashless payment medium [50:cashless], then he/she inputs or transfers his/her cashless payment medium (or its information) into the terminal [60]. The cashless payment medium is then validated and the amount of the customer's order is charged to the medium [70]. If the cashless payment medium has been accepted [80:yes], then the logic proceeds as described in the "Post Payment Logic" section below.

If the customer decides to pay in cash [50:cash], then the system prints out a slip, containing an order number and bar code [100], and logs the customer out of the order placement system [110]. The customer then proceeds to take the slip to the payment counter [120]. If the establishment is using a cash deposit machine [130:yes], then the customer simply scans the bar code on the slip into the machine [140]. The machine will then display the amount due [150]. After the customer insert his/her money into the machine [160], the machine will return the change, if any [170]. The logic then proceeds in accordance with the *"Post Payment Logic"* below.

In the case where the establishment is not using a cash deposit machine [130:no], then the customer will present his/her order slip to the staff person [180], who then proceeds to scan the slip's bar code into the system [190]. After the customer then pays the amount due [200], the staff person records the customer's payment [210]. The logic then proceeds in accordance with the *"Post Payment Logic"* below.

Post Payment Logic

The system prints the customer's receipt, which also contains the customer's order number and its associated bar code [220]. Immediately following, the customer is logged out of the order placement system, if not already [250]. At the same time that the customer's reward points information is being updated [253], as explained in FIG. 8.3.4, the customer's order is dispatched and the order begins to be processed by the establishment [260], in accordance with the Order Processing Logic (steps 110-390) in FIG 8.3.1. While this is occurring, the customer takes his/her receipt [230] and simply waits for his/her order number to be called [240]. Once the order is ready, if the establishment is not using an order number display panel [270:no], then a staff person calls out the customer's order number [290]. However, if the establishment is using an order number display panel [270:yes], then the customer's order number is automatically displayed when his/her order is ready [280]. After either of the two types of notification, the customer may then proceed to the order pickup counter [300]. When the customer presents his/her receipt to a staff person [310], the staff person scans the bar code on the customer's receipt [320]. This step eliminates any confusion as to which order belongs to which customer, as often happens in establishments today when two customers place similar orders at nearly the same time.

Once the staff person has scanned the customer's bar code and confirms the order, the staff person then gives the ordered items to the customer [330]. The customer may then leave the establishment or find open seating [340], if the establishment offers seating.

Referring now to FIG. 6.2.2.1, a diagram depicting the process logic of the terminal solution for stores using cashless payment mediums only is shown. This process begins by the customer entering the establishment [10] and proceeding to the terminal to use for ordering [20]. First, the customer selects his/her language preference [22], if the system and establishment are configured to display the terminal's screens in languages other than the primary language of the country where the establishment is located. Then, the customer enters any discount or promotion code that he/she may have, in addition to seeing if he/she qualifies for loyalty/appreciation rewards [25], as detailed in FIG. 8.3.3. After the customer has selected all of the items to add to his/her order [30] (in accordance with the Order Processing Logic in FIG. 8.3.1:steps 25-100), he/she then selects the type of cashless payment medium that he/she wishes to use [40]. After inputting or transferring his/her cashless payment medium (or its information) to the terminal [50], the system validates and charges the amount due to the cashless payment medium [60].

If the cashless payment medium is not accepted [70:no], then the customer must try a different cashless payment medium and repeat Steps 50-70, or (not depicted) cancel his/her order. In the case where the cashless payment medium has been accepted [70:yes], the system prints the customer's receipt, which also contains the customer's order number and its associated bar code [80]. Immediately following, the customer is logged out of the order placement system [110]. At the same time that the customer's reward points information is being updated [113], as explained in FIG. 8.3.4, the customer's order is dispatched and the order begins to be processed by the establishment [120], in accordance with the Order Processing Logic (steps 110-390) in FIG 8.3.1. While this is occurring, the customer takes his/her receipt [90] and simply waits for his/her order number to be called [100]. Once the order is ready, if the establishment is not using an order number display panel [130:no], then a staff person calls out the customer's order number [140]. However, if the establishment is using an order number display panel [130:yes], then the customer's order number is automatically displayed when his/her order is ready [150]. After either of the two types of notification, the customer may then proceed to the order pickup counter [160]. When the customer presents his/her receipt to a staff person [170], the staff person scans the bar code on the customer's receipt [180]. Again, this eliminates any confusion as to which order belongs to which customer, as often happens in establishments today when two customers place similar orders at nearly the same time. Once the staff person has scanned the customer's bar code and confirms the order, the staff person then gives the ordered items to the customer [190]. The customer may then leave the establishment or find open seating [200], if the establishment offers seating.

FIG. 6.2.3.1 is a diagram depicting sample screen shots of the terminal solution at a store. The various parts of the screen are not described, as they may change slightly, and as this diagram

is provided more to lend visual support to the proceeding process logic diagrams of what the customer most likely will see.

FIG. 7.1.1.1 is a diagram depicting the process logic of the mobile device solution for restaurants accepting both cash and cashless payment mediums. This process begins by the party entering the establishment [10]. Depending on the preferences of the owners of the establishment, they may choose to use or not use the automated seating system [20], which would allow customers to seat themselves, expedite the entire ordering process, and save on labor costs for the establishment. If the establishment is using the automated seating system [20:yes], then the logic would proceed as described in FIG. 8.1.3.1 [30] and later resume with the logic described in the below section, entitled "*Customer Proceeds to Table*". However, if the establishment is not using the automated seating system [20:no], then a staff person would need to ask the party leader for his/her name, the number of people in his/her party, and the party's smoking preference [40].

The staff person then inputs the party leader's name, the party count, and the party's smoking preference into the system [50]. Upon entering the information, the system will then generate a "visit code" for the customer and his/her party [60]. The staff person then prints out a slip containing the visit code and a bar code, and gives it to the party leader [70]. The slip can also be automatically printed out and dispensed by the system after the visit code has been generated in step 50.

The staff person will then check to see if a table is available [80]. If a table is available [80:yes], then the ensuing logic is described in the below section, entitled "*Staff Activates Table(s)*".

If a table is not available [80:no], then the party may browse or pre-order items [100], in accordance FIG. 8.1.3.5. This process makes the assumption that the establishment is not using a guest terminal. However, if the establishment has also made a guest terminal available, then the customer is free to use the terminal for browsing/pre-ordering, provided that no other customers are currently using it. When a table becomes available for the party, the staff person then retrieves the party's information from the system [140]. As previously mentioned, the system may also automatically display the information of the party for whom a table (or tables) is available.

Staff Activates Table(s)

The staff person activates the party's visit code for the available table(s) [150], and direct the party their table(s) [160].

Customer Proceeds to Table

The party proceeds to their table(s) [170]. Once the party has been seated at their table(s), if the customer has previously logged into the system [180:yes], then the logic continues in the below section entitled "*Table Number Transferred Check*". If the customer did not previously log into the system [180:no], then he/she must login [190] in accordance with the Mobile Login-Registration Logic in FIG. 7.3.1. Afterwards, the customer logs into the restaurant's system [200] as detailed in the Establishment Login Logic in FIG. 7.3.2.

Table Number Transferred Check

If the table number has already been transferred to the mobile device [205:yes], then the logic continues in the below section, entitled "*Complete Other Login Procedures*". One particular case in which this would occur is if the customer uses his/her mobile device in an establishment that employs the automated-seating functionality and the system is able to electronically transfer the customer's table number to his/her mobile device, perhaps via a short-range, electronic communications medium (i.e. infrared or Bluetooth).

On the other hand, if the table number has not already been transferred to the mobile device [205:no], then the customer can select the menu option on his/her mobile device to enter the table number [210]. It is important to note that in the mobile device implementation of this present invention, upon system login, it is not necessary for the customer to select his/her preferred language, as with the terminal implementation. This is because when the customer first registers to use the ordering system for his/her mobile device, he/she will download the appropriate version of the program or access the appropriate web page for his/her preferred language, if it is supported.

Continuing with the diagram logic, the customer proceeds to enter his/her table number [220]. Although the system knows the party's table number(s), it is necessary for the customer to enter his/her table number in the situation where the party may be disbursed across two or more tables. In such a case, if the customer did not enter his/her table number, the staff person would not know which of the two or more tables (assigned to the party) to deliver a particular member's order. Furthermore, the input of the table number by the customer is meant as an additional security check.

Complete Other Login Procedures

After completing the other login procedures [230], the customer inputs any discount or promotion code that he/she may have, in addition to seeing if he/she qualifies for loyalty/appreciation

rewards [235], as detailed in FIG. 8.3.3. Next, the customer selects the order menu option on his/her mobile device [240].

In the next step [250], how the customer orders depends on whether the establishment offers a detail menu listing in the system. Some establishments, who offer the ordering system for wireless devices only and who wish to use their traditional printed menu for one reason or another, would most likely not provide detailed item descriptions in the system. In such a situation [250:no] or where the customer does not wish to view/download the entire menu, orders would be placed [270] by simply entering in the item's code from the printed menu, instead of selecting the items from an electronic menu. The Order Processing Logic in FIG. 8.3.1 would be essentially the same, except that in step 30, rather than "selecting an item" from a displayed list, the customer would simply "enter the item's code". This is an optional feature to allow more traditional establishments to take advantage of allowing customers to place orders wirelessly, but still retain the "look and feel" of the menus as an integral part of their establishment's atmosphere. This feature may also be considered an intermediary step as the establishment makes a gradual transition to the electronic menu-only system.

If the establishment offers a detailed menu listing in the system [250:yes], then the customer may place orders the standard way [270] – by selecting the order item from a listing, and not using a code – as depicted in the Order Processing Logic in FIG. 8.3.1. Upon completing all ordering, all the party members log out of the system [280], as described in the Restaurant Logout Logic in FIG. 8.1.3.4. The party then pays for their bill and/or picks up the receipt at the establishment's checkout counter [290], as explained in the Payment Settlement Logic of FIG. 8.1.1.1. Once the meal has been paid for and the party receives their receipt, if one was specified, the party may then leave the establishment [300].

FIG. 7.1.2.1 is a diagram depicting the process logic of the mobile device solution for restaurants accepting cashless payment mediums only. This process begins by the party entering the establishment [10]. Depending on the preferences of the owners of the establishment, they may choose to use or not use the automated seating system [20], which would allow customers to seat themselves, expedite the entire ordering process, and save on labor costs for the establishment. If the establishment is using the automated seating system [20:yes], then the logic would proceed as described in FIG. 8.1.3.1 [30] and later resume with the logic outlined in the below section, entitled "*Customer Proceeds to Table*".

However, if the establishment is not using the automated seating system [20:no], then a staff person would need to ask the party leader for his/her name, the number of people in his/her party,

and the party's smoking preference [40]. The staff person then inputs the party leader's name, the party count, and the party's smoking preference into the system [50]. The staff person will then check to see if a table is available [60]. If a table is available [60:yes], then the ensuing logic is explained in the below section, entitled "*Staff Activates Table(s)*".

If a table is not available [60:no], then the party may browse or pre-order items [70], in accordance FIG. 8.1.3.5. This process again is based on the assumption that the establishment is not using a guest terminal. However, if the establishment has also made a guest terminal available, then the customer is free to use the terminal for browsing/pre-ordering, provided that no other customers are currently using it. When a table becomes available for the party, the staff person then retrieves the party's information from the system [80]. As previously mentioned, the system may also automatically display the information of the party for whom a table (or tables) is available.

Staff Activates Table(s)

The staff person will activate the party's visit code for a particular table (or tables) [90], and direct the party their table(s) [100].

Customer Proceeds to Table

The party proceeds to their table(s) [110]. Once the party has been seated at their table(s), if the customer has previously logged into the system [120:yes], then the logic continues in the below section entitled "*Table Number Transferred Check*". If the customer did not previously log into the system [120:no], then he/she must login [130] in accordance with the Mobile Login-Registration Logic in FIG. 7.3.1. Afterwards, the customer logs into the restaurant's system [140] as detailed in the Establishment Login Logic in FIG. 7.3.2.

Table Number Transferred Check

If the table number has already been transferred to the mobile device [145:yes], then the logic continues in the below section, entitled "*Complete Other Login Procedures*". One particular case in which this would occur is if the customer uses his/her mobile device in an establishment that employs the automated-seating functionality and the system is able to electronically transfer the customer's table number to his/her mobile device, perhaps via a short-range, electronic communications medium (i.e. infrared or Bluetooth).

On the other hand, if the table number has not already been transferred to the mobile device [145:no], then the customer can select the menu option on his/her mobile device to enter the table

number [150]. It is important to note that in the mobile device implementation of this present invention, upon system login, it is not necessary for the customer to select his/her preferred language, as with the terminal implementation. This is because when the customer first registers to use the ordering system for his/her mobile device, he/she will download the appropriate version of the program or access the appropriate web page for his/her preferred language, if it is supported.

Continuing with the diagram logic, the customer proceeds to enter his/her table number [160]. Although the system knows the party's table number(s), it is necessary for the customer to enter his/her table number in the situation where the party may be disbursed across two or more tables. In such a case, if the customer did not enter his/her table number, the staff person would not know which of the two or more tables (assigned to the party) to deliver a particular member's order. Furthermore, the input of the table number by the customer is meant as an additional security check.

Complete Other Login Procedures

After completing the other login procedures [170], the customer inputs any discount or promotion code that he/she may have, in addition to seeing if he/she qualifies for loyalty/appreciation rewards [175], as detailed in FIG. 8.3.3. Next, the customer selects the order menu option on his/her mobile device [180].

In this step [190], how the customer orders depends on whether the establishment offers a detail menu listing in the system. Some establishments, which offer the ordering system for wireless devices only and who wish to use their traditional printed menu for one reason or another, would most likely not provide detailed item descriptions in the system. In such a situation [190:no] or where the customer does not wish to view/download the entire menu, orders would be placed [200] by simply entering in the item's code from the printed menu, instead of selecting the items from an electronic menu. The Order Processing Logic in FIG. 8.3.1 would be essentially the same, except that in step 30, rather than "selecting an item" from a displayed list, the customer would simply "enter the item's code". This is an optional feature to allow more traditional establishments to take advantage of allowing customers to place orders wirelessly, but still retain the "look and feel" of the menus as an integral part of their establishment's atmosphere. This feature may also be considered an intermediary step as the establishment makes a gradual transition to the electronic menu-only system.

If the establishment offers a detailed menu listing in the system [190:yes], then the customer may place orders the standard way [200] – by selecting the order item from a listing, and not using a code – as depicted in the Order Processing Logic in FIG. 8.3.1. Upon completing all ordering, all the party members log out of the system [210], as described in the Restaurant Logout Logic in FIG.

8.1.3.4. The party then pays for their bill and/or picks up the receipt at the establishment's checkout counter [220], as explained in the Payment Settlement Logic of FIG. 8.1.2.1. Once the party receives their printed receipt, if one was specified, the party may then leave the establishment [230].

FIG. 7.1.3.1 is a diagram depicting sample screen shots of the mobile device solution at a restaurant. The various parts of the screen are not described, as they may change slightly, and as this diagram is provided more to lend visual support to the proceeding process logic diagrams of what the customer most likely will see. Note that in this depiction, the customer is adding a menu item to his/her order using a menu. However, depending on the establishment's preferences and the customer's preferences, it may be also possible for the customer to add an item to his/her order by inputting the item's code.

FIG. 7.2.1.1 is a diagram depicting the process logic of the mobile device solution for stores accepting cash and cashless payment mediums. After the customer enters the establishment [10], he/she must log into the system [20] (in accordance with the System Login-Registration Logic specified in FIG. 7.3.1) and then into the establishment's system [30] (as specified in the Establishment Login Logic in FIG. 7.3.2). It is important to note that in the mobile device implementation of this present invention, upon system login, it is not necessary for the customer to select his/her preferred language, as with the terminal implementation. This is because when the customer first registers to use the ordering system for his/her mobile device, he/she will download the appropriate version of the program or access the appropriate webpage for his/her preferred language, if it is supported. Continuing with the diagram logic, the customer next enters any discount or promotion code that he/she may have, in addition to seeing if he/she qualifies for loyalty/appreciation rewards [35], as detailed in FIG. 8.3.3. After which, the customer selects the order menu on his/her device [40],

Some establishments, who offer the ordering system for wireless devices only (e.g. no terminals involved) and who wish to use their traditional display/printed menu for one reason or another, may not provide detailed item descriptions in the system (i.e. on the mobile device). In such a situation [45: no], orders would be placed [50] by simply entering in the item's code from the display/printed menu, instead of selecting the items from an electronic menu. The Order Processing Logic in FIG. 8.3.1 would be essentially the same, except that in step 30, rather than "selecting an item" from a displayed list, the customer would simply "enter the item's code". This is an optional feature to allow more traditional establishments to take advantage of allowing customers to place orders wirelessly, but still retain the "look and feel" of the menus as an integral part of their

establishment's atmosphere. This feature may also be considered an intermediary step as the establishment makes a gradual transition to the electronic menu-only system.

If the establishment offers a detailed e-menu listing in the system [45:yes], then the customer may place orders the standard way [50] – by selecting the order item from a listing, and not using a code – as depicted in the Order Processing Logic in FIG. 8.3.1.

The ensuing process logic varies depending on the payment method that the customer specified upon login [60].

Paid by Cashless Payment Medium

If the customer is using a cashless payment medium [60:cashless], then the system charges the amount of the order to the customer's medium [70], updates the customer's payment status within the system [80], and while the system updates the customer's reward points [85], as described in FIG. 8.3.4, it also asks the customer if a receipt is needed [90]. The customer then specifies whether a receipt is needed, and if so, what type of receipt [92]. If no receipt is needed [100:no], then the logic proceeds according to the "Cashless: Post Receipt Logic" below. In the case where a receipt is needed [100:yes], the customer must select the receipt type [110]. If an email-only version of the receipt is desired [110:email], then the system emails the receipt to the customer [130]. The ensuing logic then proceeds with the process specified below in the "Cashless: Post Receipt Logic" section. In the event that the customer would like both a printed receipt and an email-version of the receipt [110:email & print], then a receipt is emailed to the customer [120]. The customer must then follow similar procedures as those paying by cash, beginning with Step 200 in the section entitled "Paid-by-Cash" below. If the customer only wants a printed receipt [110:print], then the logic ensues with step 200 in the section entitled "Paid-by-Cash" below.

Cashless: Post Receipt Logic

Because the customer's order is being placed via the system support center's Internet website, the system sends the customer's order information and payment status to the establishment's in-house server [140]. A natural extension of the present invention will be to send the customer's order and payment information directly to the establishment's in-house server via a wireless technology such as 802.11, Bluetooth, etc., but due to current technology limitations and security precautions, the current method is as specified above.

Once the establishment receives the order information, two different processes begin to simultaneously occur. One is described below in the section entitled "Post Order Transfer", and the other is focused on the customer and his/her device, which is described as follows. The system then

displays a temporary (paid) "e-ticket" (electronic ticket) on the customer's mobile device [160]. The e-ticket will contain the customer's paid status, a modified order number, and optional bar code. Since the order number will be very simple (e.g. "123" or other short alpha-numeric combination), it may be possible for someone to duplicate it at home and send the duplicated image to their mobile device. As a result, the system will dynamically append a short, random, alphanumeric combination on to the end of the basic order number, which the staff person can use to confirm the validity of the order. This is referred to as the "modified order number". The bar code is optional, as limitations in current technology and variations in the various mobile devices screen material (which may or may not allow the bar code to be read) exist.

The customer then simply waits for his/her order number to be called or displayed on the establishment's order pickup display, if available [170]. The logic that ensues, when the customer's order is in process or ready, is detailed in the *"Post Order Transfer"* section below.

Paid-by-Cash

If the customer opts to pay in cash [60:cash], then the system asks him/her if a receipt is needed [180]. The customer then specifies if a receipt is needed, and if so, the type of receipt [190]. After which, the system sends the customer's order information and payment status to the establishment's in-house server [200]. A temporary (not-paid) e-ticket will then be displayed on the customer's mobile device [210]. This temporary e-ticket varies from the previous described e-ticket in that the customer's paid status is "not paid" and the order number being displayed is the basic order number and not the modified one. The e-ticket's paid status is set to "paid" and the modified order number is displayed only after the customer has paid for his/her order. If the customer had previously paid for his/her order using a cashless payment medium and simply needs a receipt, then the paid status would be set to "paid" and the order number being displayed would be the modified one.

The customer then proceeds to the payment/receipt counter [220]. If the establishment is using a cash deposit/receipt machine [230:yes], then the customer may input/scan/transfer his/her e-ticket information into the machine [240]. In the case where the customer already paid for his/her order using a cashless payment medium [250:yes], then the system will print the customer's receipt [260]. After the customer takes his/her receipt [262], he/she will wait for his/her order number to be called/displayed [390]. When the order is ready, the logic continues with Step 410 as described in the section entitled *"Post Order Transfer"* below. If the customer had yet to pay for his/her order [250:no], then the cash deposit/receipt machine would display the amount due [270]. After the customer inserted the amount due into the machine [280], the logic would continue with the *"Post Paid-By-Cash"* section below.

If the establishment is not using a cash deposit/receipt machine [230:no], then the customer would show/scan/transfer his/her e-ticket information to the staff's device or terminal [290]. In the situation where the customer's e-ticket information is not scanned or transferred directly into the staff's device or terminal, the staff will input the customer's order number directly into the system [300]. In the event that the customer has already paid for his/her order using a cashless payment medium [310:yes], then the process proceeds with Step 360 in the *"Post Paid-By-Cash"* logic below. If the customer has yet to pay [310:no], then he/she pays the staff for the amount of the order [320]. After the staff inputs the customer's payment into the system [330], the process continues with the *"Post Paid-By-Cash"* logic below.

Post Paid-By-Cash

At this point, the system updates the customer's payment status [340]. Following which, three processes occur simultaneously. The first is described in the section below entitled *"Post Order Transfer"*. Second, the system updates the customer's reward points [345], as described in FIG. 8.3.4. The last being whether or not the customer specified if a receipt was needed [350]. If the customer previously specified that a receipt was needed [350:yes], then the system will take the appropriate action (i.e. email and/or print the appropriate receipt). In the case of a receipt not being required [350:no], the customer selects update on his/her mobile device [370]. The system will then update the e-ticket on the customer's mobile device [380]. The e-ticket should now indicate that the order status is "paid" and that the order number has alphanumeric characters appended.

The customer then only needs to wait until his/her order number is called or displayed [390]. When the customer's order is ready, then the logic proceeds in accordance with Step 410 in the section below entitled *"Post Order Transfer"*.

Post Order Transfer

The establishment processes the order [400] in accordance with Steps 110-390 of the Order Processing Logic in FIG. 8.3.1. The staff person then calls the customer's order number, or the system displays the order number on the establishment's pickup display [410]. The customer then proceeds to the order-pickup counter [420]. Depending on the technology available, the customer either shows the staff person the e-ticket on his/her (customer's) mobile device, scans the bar code on his/her mobile device into the system's bar code reader, or electronically transfers his/her e-ticket info to the establishment's terminal or device [430]. The staff person then verifies the customer's e-ticket [440] and gives the ordered item(s) to the customer [450]. After receiving his/her order item(s), the customer may leave the establishment or find free seating within the establishment [460].

FIG. 7.2.2.1 is a diagram depicting the process logic of the mobile device solution for stores that accept cashless payment mediums only. After the customer enters the establishment [10], he/she must log into the system [20] (in accordance with the System Login-Registration Logic specified in FIG. 7.3.1) and then into the establishment's system [30] (as specified in the Establishment Login Logic in FIG. 7.3.2). It is important to note that in the mobile device implementation of this present invention, upon system login, it is not necessary for the customer to select his/her preferred language, as with the terminal implementation. This is because when the customer first registers to use the ordering system for his/her mobile device, he/she will download the appropriate version of the program or access the appropriate webpage for his/her preferred language, if it is supported. Continuing with the diagram logic, the customer next enters any discount or promotion code that he/she may have, in addition to seeing if he/she qualifies for loyalty/appreciation rewards [35], as detailed in FIG. 8.3.3. The customer selects the order menu on his/her device [40].

Some establishments, that offer the ordering system for wireless devices only and who wish to use their traditional display/printed menu for one reason or another, may not provide detailed item descriptions in the system. In such a situation [45:no] or where the customer does not wish to view/download the entire menu, orders would be placed [50] by simply entering in the item's code from the display/printed menu, instead of selecting the items from an electronic menu. The Order Processing Logic in FIG. 8.3.1 would be essentially the same, except that in step 30, rather than "selecting an item" from a displayed list, the customer would simply "enter the item's code". Again this is an optional feature which allows more traditional establishments to take advantage of allowing customers to place orders wirelessly, but still retain the "look and feel" of the menus as an integral part of their establishment's atmosphere. This feature may also be considered an intermediary step as the establishment makes a gradual transition to the electronic menu-only system. If the establishment offers a detailed e-menu listing in the system [45:yes], then the customer may place orders the standard way [50] – by selecting the order item from a listing, and not using a code – as depicted in the Order Processing Logic in FIG. 8.3.1.

Next, the system charges the amount of the order to the customer's cashless payment medium [60] and updates the customer's payment status within the system [70]. At the same time that the system asks the customer on his/her mobile device if a receipt is needed [100] and updates the customer's reward points [75], as described in FIG. 8.3.4, the system also sends the customer's order information and payment status to the establishment's in-house server [80] and the establishment begins to process the order [90] (in accordance with steps 110-390 of the Order Process Logic in FIG. 8.3.1). It may be possible to also send the customer's order and payment information directly to the establishment's in-house server via a wireless technology such as 802.11,

Bluetooth, etc., but due to current technology limitations and security precautions, the current method is as specified above.

While the order is being processed, the customer specifies on his/her mobile device if a receipt is needed [110]. If a receipt is not needed [120:no], then the process continues with the logic specified in the below section, entitled *"Post Receipt Specification Logic"*. In the case where a receipt is needed [120:yes], the customer must select the receipt type [140]. If an email-only version of the receipt is desired [140:email], then the customer must specify and/or confirm the email address(es) to which he/she wishes the receipt to be sent [150]. Following confirmation, the system emails the receipt to the customer [160]. The process continues with the logic specified in the below section, entitled *"Post Receipt Specification Logic"*.

In the event that the customer would like both a printed receipt and an email-version of the receipt [140:email & print], then again, the customer first specifies and/or confirms the email address(es) to which he/she wishes the receipt to be sent [170]. After the system emails the receipt to the specified address(es) [180], the process continues below with the logic specified in the section entitled *"Printed Receipt Logic"*. If only a printed receipt is needed [140:print], then the process continues below with the logic specified in the section entitled *"Printed Receipt Logic"*.

Printed Receipt Logic

The system then prompts the customer on his/her mobile device to proceed to the receipt dispenser at the establishment [190]. After the customer inputs/scans/transfers his/her e-ticket information into the machine [200], the system dispenses the customer's printed receipt [210]. The e-ticket will contain the customer's paid status, a modified order number, and optional bar code. Since the order number will be very simple (e.g. "123" or other short alpha-numeric combination), it may be possible for someone to duplicate it at home and send the duplicate image to their mobile device. As a result, the system will dynamically append a short, random, alphanumeric combination on to the end of the basic order number, which the staff person can use to confirm the validity of the order. This is referred to as the "modified order number". The bar code is optional, as limitations in current technology and variations in the various mobile devices screen material (which may or may not allow the bar code to be read) exist.

The process that begins after the customer takes his/her receipt [220] is specified in the below section, entitled *"Post Receipt Specification Logic"*.

Post Receipt Specification Logic

After the system displays the customer's e-ticket on the customer's mobile device [240], the customer must then wait for his/her order number to be called or displayed [250]. When the customer's order is ready, the staff person will then call the customer's order number or display it on the establishment's "order-pickup" display, if available [260]. The customer then proceeds to the counter to pickup his/her order [270]. Before receiving his/her order though, the customer must show/scan/transfer his/her e-ticket information to the staff person (or to the staff person's device or terminal) [280]. The staff person then verifies the customer's e-ticket [290]. Upon successful verification, the staff person gives the customer his/her ordered items [300]. The customer is then free to leave the establishment or find seating, if available [310].

FIG. 7.2.3.1 is a diagram depicting sample screen shots of the mobile device solution at a store. The various parts of the screen are not described, as they may change slightly, and as this diagram is provided more to lend visual support to the proceeding process logic diagrams of what the customer most likely will see. Note that in this depiction, the customer is adding a menu item to his/her order using the item's code. However, depending on the establishment's preferences and the customer's preferences, it may be also possible for the customer to add an item to his/her order by selecting from a menu.

FIG. 7.3.1 is a diagram depicting the system login and registration process logic for mobile devices. If it is not the customer's first time using the system [10:no], he/she simply accesses the order system's application or web page on his/her mobile device [200]. A check is then performed to see if the customer has enabled his/her mobile device for auto-login upon startup [210]. Auto-login simply refers to the system automatically sending the customer's login information (i.e. id and password) to server, rather than requiring the customer to manually enter and send it him/herself. This depends in part on the customer's security preferences and if the feature is available on the mobile device. If the customer has not enabled auto-login [210:no], then the logic continues in the below section, entitled "*Login Logic*". On the other hand, if he/she has enabled auto-login [210:yes], then the logic continues in the below section, entitled "*Verify Login*".

However, if it is the customer's first time using the system [10:yes], then he/she needs to access the system support center's website using his/her mobile device [20]. The customer then registers his/her personal information to become a member of the service [25]. Next, the customer downloads the system's ordering application or accesses the next corresponding web page [30]. It is to be stressed that the ordering application is capable of being deployed either as a program downloaded to the customer's mobile device or as a web service whereby the customer would simply access various web pages. As such, this diagram describes the logic such that it is

applicable to either method of using the ordering system. However, this system prefers the method of having the customer download the application to his/her mobile device since keeping core parts of the application and its related data on the mobile device will reduce the amount of data traveling over the network, which will reduce costs for the customer (whereby the customer pays for each packet of data transmitted) and improve response times.

The customer then may need to register other personal information and his/her system preferences [40]. Next, because it is possible that payments can be processed via the mobile device's mobile phone gateway provider or internet service provider (whereby a customer's purchase will appear on his/her mobile provider's bill, and the mobile provider in turn pays the merchant), a check must be made to see if the mobile provider's payment mechanism is being used to handle payments [45]. If so [45:yes], the logic continues with that specified in the below section entitled "*Save Customer Information*". Otherwise, if the mobile provider's payment mechanism is not being used [45:no], then the customer is asked by the system if he/she would like to register a cashless payment medium [50], which offers the benefit to the customer of avoiding extra procedures and waiting time faced by those paying in cash. If the customer does not wish to register a cashless payment medium at this time [50:no], the logic continues with that specified in the below section, entitled "*Save Customer Information*".

However, if the customer does wish to register a cashless payment medium [50:yes], then he/she inputs the information for his/her cashless payment medium [60].

Confirms Cashless Payment Medium

The customer confirms that his/her cashless payment medium information is correct [70]. If the customer determines that there is a mistake in the information inputted [80:no], he/she may then modify the cashless payment medium's information [90] and the logic returns to the above section entitled "*Confirms Cashless Payment Medium*". Otherwise, if the information is correct [80:yes], the system then validates the cashless payment medium [100]. If the customer's cashless payment medium is accepted [110:yes], then the process continues with the below section, entitled "*Save Customer Information*".

In the event that the cashless payment medium is not accepted [110:no], the customer has two options depending on whether the system is a cashless only one or not. If the system accepts cashless payment mediums (i.e. no cash) only [120:yes], then the customer will need to modify his/her medium's information [90] and the logic returns to the above section, entitled "*Confirms Cashless Payment Medium*". If the system also accepts cash [120:no], then the customer will be asked if he/she would like to simply use cash or try again at registering a cashless payment medium

[130]. If the customer wants to continue trying to register a cashless payment medium [130:no], then he/she must modify his/her cashless payment medium [90], after which the logic returns to the above section, entitled "*Confirms Cashless Payment Medium*". On the other hand, if the customer simply wants to use cash (i.e. he/she may not have a another cashless payment medium) [130:yes], he/she may do so and the process will continue as specified in the below section, entitled "*Save Customer Information*".

Save Customer Information

The system saves the customer's preferences and other information [145]. If the customer does not wish to currently use the ordering feature [150:no], then the system will display the main menu or web page [160]. However, if the customer does wish to use the system immediately [150:yes], then the logic continues as follows.

Login Logic

The customer inputs his/her login information [300].

Verify Login

After the system verifies that the customer's login information is correct [302], a check is performed to see if the system automatically transferred the establishment's id to the customer's mobile device [305]. This may occur if the establishment is employing the automated seating system and the system automatically transfers the establishment's id to the mobile device, perhaps via a short-range, electronic communications medium (i.e. infrared or Bluetooth).

If the establishment's id is not automatically transferred to the customer's mobile device [305:no], then the customer must enter the establishment's id or select the establishment from a pre-existing list of registered establishments [310]. However, if the establishment's id has been automatically transferred to the customer's mobile device [305:yes], then no further system login input is required of the customer.

FIG. 7.3.2 is a diagram depicting the establishment login process logic for mobile devices. If the establishment is a store [10:store], then the logic proceeds in accordance with the steps described in the below section, entitled "*System Type Logic*". In the case where the establishment is a restaurant (or other seated establishment) [10:restaurant], then the logic that follows depends on the type of system being used by the establishment [20]. If the system accepts cash and cashless payments [20:cash & cashless], then the customer must enter his/her visit code [30], as well as the party leader's name, and if not the party leader, his/her own party-unique name [40]. If the system

accepts cashless-only payments [20:cashless only], then the customer only needs to input the party leader's name, and if not the party leader, his/her own party-unique name [40]. Other members of the party, besides the party leader, can log into the system using the party's visit code, the party leader's name, and their own party-unique name. It is important to note that once the party leader has logged in, it is not possible for anyone else to log in with the same name and visit code. Non-party leader members will be able to add items to the order, as presented in FIG. 8.3.1, but he/she will not be able to place the order. The party leader will need to confirm the member's order [FIG 8.3.1:104-106], unless the leader specifies that the member is a trusted orderer, in which case the member will then be able to directly place orders.

The system then checks to see whether the customer is the party leader [50]. If so [50:yes], then the logic proceeds in accordance with the steps described in the below section, entitled "*System Type Logic*". If the customer is not the party leader [50:no], then system must check the establishment's preferences to see if it allows party members to pay separately [60]. In the event party members are not allowed to pay separately [60:no], then refer the below section entitled "*Continue*". If party members can indeed pay separately [60:yes], then the customer will be asked if he/she does in fact want to pay for his/her own order(s) [70]. In the case that the party member does not wish to pay for him/herself [70:no], then refer to the below section entitled "*Continue*". Otherwise [70:yes], the logic proceeds in the below section, entitled "*System Type Logic*".

System Type Logic

If the system is a cashless only system [80:cashless only], then the system validates the customer's cashless payment medium [100] and the logic continues as specified in the below section entitled "*Continue*". If the system accepts both cash and cashless payments [80:cash & cashless], and the customer wishes to pay with his/her cashless payment medium [90:cashless], then the system again validates the customer's cashless payment medium [100] and the logic continues as specified in the below section, entitled "*Continue*". Otherwise, if the customer is simply paying in cash [90:cash], then the logic continues as specified in the below section entitled "*Continue*".

It is to be noted that in the event that a cashless payment medium is not registered, where one is required, or there is a problem with the validation, then the customer will be prompted to try again or register a different medium. This holds true for all cases in this diagram where the system "validates cashless payment medium".

Continue

The process logic returns to the diagram that referenced this process logic diagram.

Referring to FIG. 8.1.1.1, a diagram depicting the payment settlement logic for restaurants accepting cash and cashless payment mediums is shown. This process begins with the assumption that the customer has logged out of the order system. If the customer previously specified that he/she would pay using a cashless payment medium [10:cashless], then his/her medium is charged for the amount that he/she owes [20]. Afterwards, the ensuing logic is the same as if the customer had previously specified that he/she would pay by cash [10:cash]. The customer proceeds to the checkout counter or cashier area [30]. If the establishment has a payment/receipt machine [35:yes], which automatically accepts payments from and issues receipts to customers, then the logic continues in the below section, entitled "*Automated Payment Acceptance*". Otherwise, if the establishment is not using a payment/receipt machine [35:no], the logic proceeds as explained in the below section, entitled "*Manual Payment Acceptance*".

Automated Payment Acceptance

If the customer used his/her mobile device for ordering and the mobile device has short-range communication capability (i.e. infrared, Bluetooth) [100:yes], then the customer may wirelessly transfer his/her customer id and other information to the payment/receipt machine [110]. However, if the customer was not using or does not have a mobile device with short-range communication capability [100:no], then he/she must scan the bar code from his/her visit slip into the payment/receipt machine [120]. In either case (110 or 120), the next step depends upon the customer's payment method [130]. If the customer is paying in cash [130:cash], then the payment/receipt machine will display the amount due [140]. The ensuing logic is described in the below section entitled "*Pay Bill*".

If the customer's preferred payment method is cashless [130:cashless], then the bill should have already been charged to his/her cashless payment medium upon finishing ordering. As such, the payment/receipt machine simply needs to confirm that the customer's payment has been accepted and that the customer successfully logged out of the ordering system [150]. As a security measure, if the customer has not specified that he/she needs a receipt, the payment/receipt machine may issue a simple slip, indicating that the customer paid in full and which may be presented to a staff person, security person, or other individual upon exiting the establishment. The ensuing logic continues in the below section, entitled "*Receipt Logic*".

Manual Payment Acceptance

If the customer used his/her mobile device for ordering and the mobile device has short-range communication capability (i.e. infrared, Bluetooth) [40:yes], then the customer may wirelessly transfer his/her customer id and other information to the staff person's terminal or other device [45]. The ensuing logic continues in the below section, entitled "*Manual Payment Acceptance: Display Customer Information*". However, If the customer did not use a mobile device, which has short-range communication capability, for ordering [40:no], then he/she simply presents his/her visit slip to the staff person [50]. The staff person then scans the bar code on the visit slip into the system [55].

Manual Payment Acceptance: Display Customer Information

The system then displays the customer's order information [60]. If the customer paid using a cashless payment medium [70:cashless], then the staff person simply needs to confirm that the customer has indeed logged out of the system successfully and that the customer's payment was accepted [80]. The logic continues as described in the below section entitled "*Receipt Logic*". However, if the customer previously specified that he/she would pay in cash [70:cash], then the staff person tells the customer the bill total [90].

Pay Bill Logic

The customer then pays for his/her bill by inserting cash or other payment medium into the machine [200].

Receipt Logic

The system checks to see if a receipt was previously requested by the customer [210]. If not [210:no], refer to the below section, entitled "*Close Transaction*". If a receipt was previously specified [210:yes], the system queries itself to determine which type of receipt was requested [220]. If the customer specified that he/she would like to receipt an email-only receipt [220:email], then the system emails or electronically transfers a receipt to the customer [260]. The ensuing logic is explained in the below section, entitled "*Close Transaction*". In the case that the customer specified that he/she would like both an emailed and printed receipt [220:email & print], then the system emails or electronically transfers a receipt to the customer [230]. The ensuing logic, which is the same as if the customer had specified a printed receipt [220:print], is described in the below section, entitled "*Print Receipt*".

Print Receipt

After the system prints out the customer's receipt [240], the customer takes his/her receipt [250].

Close Transaction

The customer and his/her party's visit transaction is closed automatically by the system, if the customer used the payment/receipt machine, or manually by a staff person, if no payment/receipt machine was used [270]. The visit transaction will not be officially closed until all of the paying members in the party have paid, if paying separately and have requested receipts.

FIG. 8.1.2.1 is a diagram depicting the payment settlement logic for restaurants accepting cashless payment mediums only. At the point that the customer and his/her party logs out of the system, the amount due is charged to the customer's cashless payment medium [10]. It is noted that in the situation where several of the party members have registered that they will pay separately, then each paying member's cashless payment medium is also charged. Because each cashless payment medium transaction usually incurs a slight fee, the customer's medium may not be charged after each order placed (in FIG. 8.3.1), but rather after he/she and his/her party has indicated that they have finished all ordering. Another reason for waiting until logout to charge the customer's medium is that there are mediums (e.g. credit card, debit card, etc.) that allow a temporary charge to be placed on the medium until the full or actual bill charged. However, for cashless payment mediums where the process of storing the medium's information and charging it later may not be possible or does not make good business sense, then the medium may be charged before each placed order is accepted. This may be the case with some forms of pre-paid cards.

If there is a problem with the transaction [20:yes], then a staff person will be notified [30]. Otherwise [20:no], the system will be queried to see if the customer had previously requested a receipt [40]. In this case a printed receipt was not specified [40:no], then the logic continues with the below section, entitled "*Close Transaction*". Otherwise [40:yes], the system queries itself to determine which type of receipt was requested [50].

If the customer specified that he/she would like to receive an email-only receipt [50:email], then the system emails or electronically transfers a receipt to the customer [60] and the ensuing logic is explained in the below section, entitled "*Close Transaction*". In the case that the customer specified that he/she would like both an emailed and printed receipt [50:email & print], then the system emails or electronically transfers a receipt to the customer [70]. The ensuing logic, which is the same as if the customer had specified a printed receipt [50:print], is described in the below section, entitled "*Notify Customer*".

Notify Customer

The system notifies the customer to proceed to the checkout/receipt counter to obtain his/her printed receipt [80]. The customer then goes to the checkout/receipt counter [90]. If the customer used a mobile device, having short-range communications capability [95:yes], then he/she simply transfers his/her customer id and other information to the receipt device [97]. The ensuing logic continues in the below section, entitled "*Print Receipt*". Otherwise [95:no], he/she selects his/her cashless payment medium type [100] and swipes/inputs/transfers his/her medium or its information to the receipt device or terminal [110].

Print Receipt

After the system prints out the customer's receipt [120], the customer may take his/her receipt [130].

Close Transaction

The system then closes the customer and his/her party's visit transaction [140]. The visit transaction will not be officially closed until all of the paying members in the party have paid and received their receipts.

FIG. 8.1.3.1 is a diagram depicting the automated seating logic for restaurants. This process begins with the pre-table available check, as described in FIG. 8.1.3.2 (Step 10:pre-table avail. check) [10]. Based on information that is input, the system will determine if a table is available [20]. A check will then be performed by the system to determine if there are any tables available and that the automated seating system is not on hold [30]. The automated seating system may be placed on hold by the wait staff if they need, for some reason or another, to resolve a seating situation manually, and temporarily do not want the system to automatically seat customers.

If there are table(s) available and the automated seating system is not on hold [30:yes], then the system will check to see if an available table will accommodate the total number of customers in the party [40]. If the party size is not greater than the maximum seat count of the available table(s) [40:no], implying that a table is available that will accommodate the party, then the logic continues with that described in the below section, entitled "*Table Immediately Available*".

In the situation where none of the available tables will accommodate the entire party [40:yes], the system will perform a check to see if any two adjacent tables are available [100]. If there are [100:yes], the ensuing logic is explained in the below section, entitled "*Table Immediately Available*". On the other hand, if two adjacent tables are not available [100:no], then a message indicating such will be displayed to the party leader [110]. The party leader must then indicate whether he/she and his/her party want to 1) check if any combination of tables to accommodate the party is available, 2) wait for adjacent tables, or 3) not wait (and leave the establishment) [120].

If the party does not wish to wait [120:not wait], they may leave the establishment [130]. In the situation where the party wishes to wait for adjacent tables [120:wait for adjacent tables], then the party leader enters his/her information into the login terminal/device [140] as outlined in FIG. 8.1.3.2 (Step 300:post-table avail. check). The system will then add the party to a wait queue (for adjacent tables) [150]. The party must then wait [200] until adjacent tables become available. The logic for what occurs when a table becomes available is described in the below section entitled "*Table Becomes Available*". If the party leader decides that any combination of available tables is acceptable [120:any tables], then the system will check to see if the number of tables necessary is available for the party [160]. If there are [160:yes], the ensuing logic is explained in the below section, entitled "*Table Immediately Available*". If the necessary number of tables is not available [160:no], the party leader may then decide whether or not his/her party will wait [170]. If the party does not wish to wait [170:no], then they are free to leave the establishment [130]. If the party decides to wait [170:yes], then the party leader will need to input his/her information [180] as outlined in FIG. 8.1.3.2 (step 300:post-table avail. check). The system will then add the party to the wait queue (for any available tables) [190], after which the party simply waits [200]. The logic for what occurs when a table becomes available is described in the below section entitled "*Table Becomes Available*".

Frequently, there will be times when absolutely no tables are available (and thus no party size versus table seating size checks will be able to be done) [30:no]. In such case, the party may decide whether they would like to wait or not [300]. If they do not wish to wait [300:no], they may leave the establishment [310]. However, if the party would like to wait [300:yes], then the party leader must enter his/her information [320], as specified in FIG. 8.1.3.2 (Step 300:post-table avail. check). Once completed, the party is then added to the wait queue [330].

If there is a guest terminal in the waiting area [340:yes], then the party may browse the menu or pre-order items [350], in accordance with the logic outlined in FIG. 8.1.3.5 (Step 10:terminal). In the event that a guest terminal is not available [340:no], then the party members may still be able to browse the menu [380]. If the party members do not have a mobile device or choose not to browse/pre-order using their mobile device [380:no], then they must wait until a table

becomes available [400]. The logic for what occurs when a table becomes available is described in the below section entitled *"Table Becomes Available"*. If any of the party members wishes to browse/pre-order with their mobile device [380:yes], he/she may do so as specified in FIG. 8.1.3.5 (Step 10:mobile) [390].

Regardless of whether the guest terminal or a mobile device was used for browsing/pre-ordering, the logic to describe the process when a table becomes available is described in the below section, entitled *"Table Becomes Available"*.

Table Becomes Available

If the establishment is using a cash and cashless capable system [500:cash & cashless], then the system will show on a special, "table-available" display, the party leader's name, party count, and directions to confirm the party's seating [510]. The ensuing logic is described in the below section, entitled *"Table Becomes Available: Visit Slip Check"*. On the other hand, if the establishment is using a cashless only system [500:cashless only], then the "table-available" display will show the party leader's name, party count, and table number(s) [520]. The ensuing logic immediately follows (below).

Table Becomes Available: Visit Slip Check

If the party leader has a visit slip [530:yes], then he/she proceeds to the auto-seating or similar device, scans the bar code on his/her party's visit slip [540]. The system may optionally print out the party's table number on the visit slip or on a separate piece of paper [550], and the logic continues in the below section, entitled *"Activate Visit Code"*. If the party leader does not have a visit slip [530:no], then the logic varies depending on whether the customer/party leader is using a mobile device with short-range communication capability (i.e. infrared, Bluetooth) [560]. If he/she is not using a mobile device with such capability [560:no], the ensuing logic is explained in the below section, entitled *"Activate Visit Code"*. Otherwise, if the party leader does have such a mobile device [560:yes], then he/she must transmit his/her customer id and other information to the auto-seating or similar device/terminal [570]. The system then wirelessly transfers the available table number(s) to the customer's mobile device [580]. The ensuing logic is described in the below section, entitled *"Activate Visit Code"*.

Table Immediately Available

The party leader proceeds to input his/her information [50], as described in FIG. 8.1.3.2 (Step 300:post-table avail. check), and the logic continues as described below.

Activate Visit Code

The system activates the party's visit code or the customer's account [590], and the logic flow returns to the diagram that referenced the logic in this diagram.

FIG. 8.1.3.2 is a diagram depicting the customer information input process logic, which is used primarily by FIG. 8.1.3.1 in the automated seating process logic, for restaurants. The point at which the process begins depends upon the timing from the Automated Seating Process Logic diagram [FIG. 8.1.3.1] [10]. If the request for the customer to input his/her information occurs before the table availability check [10:pre-table avail. check], then the logic that ensues is described in the below section, entitled "*Pre-Table Availability Check*". However, if the request for the customer's information occurs after the check to see if a table is available or not [10:post-table avail. check], then the logic continues with that explain in the below section, entitled "*Post-Table Availability Check*".

Pre-Table Availability Check

If the customer does not have a mobile device, which is equipped with short-range communication capability (i.e. infrared, Bluetooth), nor a system card, which is a card specifically for use with the ordering system [20:no], then he/she must use the special seating device or terminal and select his/her language preference [30]. Next, the customer inputs his/her party count and the party's smoking preference [40]. The ensuing logic is explained in the below section, entitled "*Pre-Table Availability Check: Transfer Information to Server*".

If the customer does have a mobile device, which is equipped with short-range communication capability (i.e. infrared, Bluetooth), or a system card [20:yes], then the logic that follows varies depending on whether the customer is using a mobile device or a system card [50]. If the customer is using a system card [50:card], then he/she inputs (or swipes) the system card into the seating device or terminal [60]. The ensuing logic is described in the below section, entitled "*Send Customer ID to Server*".

On the other hand, if the customer is using a mobile device with short-range communication capability [50:mobile], then the ensuing logic varies depending on whether the mobile device has a wireless auto-notify capability and is activated [70]. A wireless device has this capability if it is equipped with a short-range communication technology (i.e. Bluetooth), whereby the mobile device is able to auto-negotiate wireless communication with a nearby device equipped with identical or

similar technology. In such a scenario, it is possible for the nearby device to actually initiate wireless communication with the customer's mobile device, if the customer has activated this feature on his/her device. If the customer does not have this type of mobile device, or does but the auto-notify feature is not activated [70:no], then he/she must log into the ordering system, as outlined in FIG. 7.3.1 [80]. The customer then manually transmits his/her customer id to the seating device or terminal (i.e. by pushing a button on the mobile device) [90]. The ensuing logic is described in the below section, entitled "*Send Customer ID to Server*".

However, if the customer does possess a mobile device with wireless, auto-negotiating communication capability and has the auto-notify feature activated [70:yes], the system or auto-seating device or terminal wirelessly auto-negotiates a connection with the mobile device as soon as the customer enters the establishment [100]. Even without the customer removing the mobile device from his/her pocket or bag, the system is able to automatically log the customer into the system [110]. This adds the extra benefit to the customer of not having to manually login, nor having to press any buttons to indicate to the establishment that he/she has arrived. The establishment benefits in that, because the customer's id is automatically transferred to the server, they know *who* (i.e. a preferred or valued customer) has entered their establishment and allows management to greet the customer and add a personal touch to that customer's experience during their visit.

Send Customer ID to Server

The system sends the customer's id from the seating device or terminal to the server [120], at which point the customer's information and preferences are retrieved [130]. While a notification of this particular customer's arrival can optionally be sent to the staff's terminal and display the customer's information (this feature is known as "auto-notification of customer arrival") [140], the customer confirms his/her party's smoking preference and enters the number of people in his/her party [150].

Pre-Table Availability Check: Transfer Information to Server

The customer's information and preferences are transferred to the server [160], and the logic returns to the diagram that referenced this diagram's logic.

Post-Table Availability Check

If the customer used a mobile device or a system card previously (in the *Pre-Table Availability Check*) [300:yes], then the logic that ensues is described in the below section, entitled "*Post-Table Availability Check: Used Mobile Device or System Card*". Otherwise, if the customer did

not use a mobile device or a system card [300:no], then the auto-seating device or terminal will prompt the customer to input his/her information, including payment details [310].

If the system handles both cash and cashless payments [320:cash&cashless], then the customer selects his/her desired payment method [330]. If the payment method specified is cash [340:cash], then the logic proceeds in the below section, entitled "*Post-Table Availability Check: Input Name*". In the case where the preferred payment is cashless [340:cashless], the ensuing logic is described in the below section, entitled "*Post-Table Availability Check: Select Cashless Payment Medium*". Given that the system is setup for cashless only processing [320:cashless only], the logic proceeds as follows.

Post-Table Availability Check: Select Cashless Payment Medium

The customer selects his/her cashless payment medium type (i.e. credit, debit, pre-paid, smart card) on the auto-seating device/terminal [350] and then inputs into or transfers his/her medium's information to the auto-seating device/terminal [360]. If the auto-seating device/terminal is able to discern the customer's name from his/her cashless payment medium [370:yes], then the logic continues as described in the below section, entitled "*Post-Table Availability Check: System Type*". However, if the customer's name is indeterminable from the medium [370:no], the logic proceeds as follows.

Post-Table Availability Check: Input Name

The customer manually inputs his/her name [380]. Note that this can be any arbitrary name and not necessarily his/her full name. The logic that ensues depends upon the type of system being deployed [600] and is described in the below section entitled "*Post-Table Availability Check: System Type*".

Post-Table Availability Check: Used Mobile Device or System Card

If the customer previously used a system card to transfer/input his/her preferences [500:card], then the logic ensues in the below section, entitled "*Post-Table Availability Check: System Type*". Otherwise, if the customer used a mobile device, having short-range communication capability (i.e. infrared, Bluetooth) [500:mobile], the server will transfer, save, and display the customer's bar code and visit code on his/her mobile device [510]. In the event that the system has

determined that a table is immediately available for the customer [520:yes], then the server will additionally transfer, save, and display the customer's table number on his/her mobile device [530].

Whether a table is available (as just described) or not available [520:no], the server checks to see if it is also necessary to print out a slip, for additional verification purposes, for the customer, depending on the preferences of the establishment or system [540]. The reason being is that should two customer or parties have a discrepancy over the same table (i.e. in the extremely unlikely event that a customer has created a fake image on the mobile device to create seemingly valid information), the slip will ultimately decide which customer or party has valid information. Such a scenario is extremely unlikely, but the additional logic for slip verification is provided here as a safeguard. If printed slip verification is necessary [540:yes], then the ensuing logic is described in the below section, entitled "*Post-Table Availability Check: System Type*". Otherwise [540:no], the logic flow returns to the diagram that referenced the logic described in this diagram.

Post-Table Availability Check: System Type

If the system accepts cash and cashless payment mediums [600:cash & cashless], then the system will generate and print out a slip, with a visit code and bar code, for the customer and his/her party [610]. The ensuing logic is described in the below section, entitled "*Post-Table Availability Check: Table Availability*". If the system accepts cashless payment mediums only [600:cashless only], then a check is performed to see if the system is configured to print slips in the cashless-only environments [620]. If not [620:no], then if a table is available [624:yes], then the customer's table number is displayed on the auto-seating device or terminal [626] (provided that the customer is using the auto-seating device or terminal and not his/her own mobile device). However, if a table is not available [624:no], then the logic flow returns to the logic diagram that referenced this logic diagram. In the case where the system is configured to print slips in the cashless-only setting [620:yes], then the system generates and prints a visit slip for the customer that includes a bar code and the customer's name [630].

Post-Table Availability Check: Table Availability

If a table is available for the customer [640:yes], then the auto-seating device will also print the table number on the customer's visit slip [650]. Whether a table is available or not [640:no], the customer takes the generated slip [660] and the process returns to the logic diagram that referenced this logic diagram.

FIG. 8.1.3.4 is a diagram depicting the logout logic for restaurants. Upon the customer selecting the logout button on his/her terminal or mobile device, the system asks the customer if he/she would like to leave feedback to the establishment about the quality of the food, service, etc. [10]. Asking the customer for this information is optional and whether this question is asked to the customer depends upon the preferences of the establishment.

If the customer wishes to leave feedback [10:yes], then the customer may proceed to enter comments about the quality of the food, service, etc. [20]. The system then displays the customer's input and asks the customer to confirm the input [30]. If the confirmation is acceptable to the customer [40:no], the system saves the customer's feedback [43] and the logic continues in the below section entitled "*Tip Logic*". Otherwise [40:yes], the customer may modify his/her input by repeating steps 20-30.

In the case where the customer does not wish to leave feedback [10:no], then the logic continues as follows.

Tip Logic

Next, the system asks the customer if he/she would like to leave a tip [50]. Asking the customer for this information is completely optional, as some restaurants automatically include the tip as a gratuity charge. Also, in some countries, tipping is not commonplace. As a result, whether this question is asked to the customer depends upon the preferences of the establishment and in some cases, on cultural standards. In a party where members other than the party leader are also paying, then this question is only asked of the party leader.

If the establishment asks this question of the customer and the customer wishes to leave a tip [50:yes], then the system displays the total order/bill amount (to aid the customer in making his/her decision) [55]. After the customer enters the tip amount or percentage [60], the system displays the customer's input and asks the customer to confirm [70]. If no modifications are necessary [80:no], then the system saves the tip information [83] and the logic continues in the below section, entitled "*Receipt Logic*". Otherwise if modifications are needed [80:yes], the customer may modify his/her input by repeating steps 55-80.

Receipt Logic

The customer next specifies his/her receipt preferences [90], in accordance with the Receipt Specification Logic described in FIG. 8.3.2. After the customer has specified his/her receipt preferences, the system executes the Reward Points Update Logic [95], as set forth in FIG. 8.3.4, and officially logs the customer out of the establishment's system [100].

Referring now to FIG. 8.1.3.5, a diagram depicting the browsing/pre-ordering process logic for restaurants is shown. If the establishment has a guest terminal and the customer wishes to use it to browse/pre-order [10:terminal], then the customer may proceed to the guest terminal [80]. He/she then enters his/her language preference [85] into the terminal, if the system and establishment are configured to display screens in languages other than the primary language of the country where the establishment is located. Next, the customer may browse/pre-order items as explained in the below section, entitled *"Browse/Pre-Order"*. In the case where the customer wishes to use his/her mobile device to browse/pre-order [10:mobile], then he/she must log into the ordering system [15], as described in the System Login-Registration Logic of FIG. 7.3.1, but only if he/she has not logged in previously (i.e. using auto-seating system). The customer then selects the browse/pre-order option on his/her mobile device [20].

If an "e-menu" listing is not available [25:no], then the customer must complete the login procedures for the establishment [30] (if he/she has not done so already), which are detailed in FIG. 7.3.2, in order to pre-order items. An "e-menu", short for "electronic menu", refers to an actual listing of the menu items on the customer's mobile device. The menu listing would include, but not limited to, name of the item, description, price, an optional picture, and other details. As mentioned in previous diagram descriptions, some establishments may prefer to use their existing printed menus and offer a basic ordering system, in which the customer would simply input the menu item's code into his/her mobile device. Such a system would not include an "e-menu", as all of the menu item details would be presented on the printed menu and not on the customer's mobile device.

After the customer enters the code of the item that he/she wishes to pre-order [35], the system saves the customer's pre-ordered item [40]. If the customer is finished pre-ordering items [50:finished], the ensuing logic is described in the below section, entitled *"Finished"*. In the event a table is available [50:table avail.], the ensuing logic is described in the below section, entitled *"Table Available"*. However, if the customer has not finished pre-ordering or a table is not yet available [50:no], he/she may continue to pre-order by repeating steps 35-50. If an e-menu listing is available [25:yes], whereby the customer may see the actual menu items on his/her device, then the logic that ensues depends on whether or not the e-menu is publicly visible [60]. Depending on the establishment's preferences, it may not want to allow anyone to view their e-menu (possibly for competitive reasons). As such, the establishment can require that the customer complete the establishment's login procedures in order to browse/pre-order (i.e. require that the customer be physically present to browse/pre-order).

If the e-menu is not publicly accessible [60:no], then the customer will be required to complete the establishment's login procedures [70], as detailed in FIG. 7.3.2, but only if he/she has

not done so already. Otherwise [60:yes], the customer may browse/pre-order as described in the below section, entitled *"Browse/Pre-Order"*.

Browse/Pre-Order

The customer, whether using the guest terminal or his/her own mobile device, proceeds to browse the available menu items [90]. While browsing the items, he/she may decide to pre-order a particular item [90:pre-order], in which case the system will then check to see if the customer previously completed the establishment's login procedures [110]. If the customer previously completed the establishment's login procedures [110:yes], then the ensuing logic is explained in the below section, entitled *"E-menu – Save Pre-Ordered Item"*. Otherwise [110:no], then establishment login will be required depending on the device type [120].

If the customer is using a mobile device for browsing/pre-ordering [120:mobile], then he/she will need to complete the establishment's login procedures [130], as explained in FIG. 7.3.2, but only if he/she has not done so already. The ensuing logic is explained in the below section, entitled *"E-menu – Save Pre-Ordered Item"*. However, in the case that the customer is using the establishment's guest terminal [120:terminal], then the login procedure varies depending on the system type [140].

If the establishment's system accepts both cash and cashless payment mediums [140:cash & cashless], then the customer simply enters the party's visit code, the party leader's name, and if he/she is not the party leader, his/her screen name [150]. The ensuing logic is explained in the below section, entitled *"E-menu – Save Pre-Ordered Item"*. In the situation that the establishment's system only accepts cashless payment mediums [140:cashless], then the customer must select his/her cashless payment medium type [160] and then input or transfer his/her cashless payment medium (or its information) to the terminal [170]. The system then verifies that the cashless payment medium specified is identical to the one given by the customer upon walk-in [180], as depicted in the process logic of FIG. 6.1.1.1. The ensuing logic is explained in the below section, entitled *"E-menu – Save Pre-Ordered Item"*.

E-menu – Save Pre-Ordered Item

The system saves the menu item that the customer pre-ordered [190]. If the customer is finished pre-ordering items [200:finished], the ensuing logic is described in the below section, entitled *"Finished"*. In the event a table is available [200:table avail.], the ensuing logic is described in the below section, entitled *"Table Available"*. However, if the customer has not finished pre-

ordering or a table is not yet available [200:no], he/she may continue to pre-order by repeating the steps given in the above section, entitled *"Browse/Pre-Order"*.

Table Available

If a table becomes available while the customer is still browsing/pre-ordering, the system displays a message on the guest terminal or the customer's mobile device that a table is available [210]. If the establishment is not using the automated seating system [220:no], the ensuing logic is described in the below section, entitled *"Finished"*. However, if the establishment is using the automated seating system [220:yes], then the message displayed next on the guest terminal or customer's mobile device depends on the system type [230].

If the establishment's system accepts cash and cashless payment mediums [230:cash & cashless], then the system will display a message to the customer to scan the bar code on his/her visit slip into the bar code reader [240]. In the case that the establishment only accepts cashless payment mediums [230:cashless], then the system will display the table number(s) that are available for the customer and his/her party [250]. The ensuing logic for both system types is described in the below section, entitled *"Finished"*.

Finished

The customer's next action depends on which type of device he/she is using [260]. If the customer is using his/her own mobile device [260:mobile], then he/she will select the option to finish browsing/pre-ordering [280]. Otherwise, if the customer is using the establishment's guest terminal [260:terminal], then he/she will need to select the logout option [270].

Regardless of the device being used, if a table is available [290:yes], the logic flow will return to the diagram that referenced this diagram. However, if a table is not available [290:no], then the customer and his/her party will simply have to wait until a table is available [300]. Upon a table being available, the ensuing logic is that of the diagram which referenced this diagram.

FIG. 8.3.1 serves as the core order processing logic that all implementations share, regardless of establishment (restaurant or store), device type (terminal or mobile device), and payment method (cash-and-cashless or cashless only). The logic begins by checking to see if a customer has previously added any items to his/her order list or "basket" [10] during pre-ordering. This would be true if the customer had previously added items using a guest terminal or his/her mobile device while waiting to be seated.

In the event that items were previously added to the customer's order list [10:yes], then the saved items would be loaded from the system [20]. If, however, the customer had no previously added items in his/her order list [10:no], then the order process would begin by the customer 1) selecting the new order option/button [25], 2) selecting an item to order [30]; 3) selecting the item quantity, optionally specifying for whom the item is for, and the preparation options associated with the item [40]; and 4) adding the item to the order list [50]. The customer is then asked if they would like to add more items to their order [60]. If "yes" [60:yes], then steps 30-60 will be repeated. Otherwise, if the customer does not wish to add any more items [60:no], the system will display all of the items in the order list [70] and ask for confirmation of the order [80]. If the order is not acceptable [80:no], then the customer will be able to modify the order [90], in which case steps 70-80 will be repeated again. Once the customer has confirmed that the order is acceptable [80:yes], he/she will then submit the order [100].

The system will then check to see if the customer placing the order is a "trusted orderer" [104]. A "trusted orderer" is another customer in the party, besides the "party leader" (the person whose name was taken by the wait-staff and/or entered into the system as the party representative or "leader"), who is also placing orders and whom the party leader has specified that his/her orders can be submitted without approval. Basically, this is a security measure, more applicable to the cash and cashless restaurant scenario, because the party leader is responsible for all orders placed by his/her party and although extremely unlikely, it is not impossible for an outside "hacker" to guess the party's visit code and randomly place orders on the party's account. As such, all orders placed by anyone besides the party leader will require confirmation, unless the party leader specifies that he/she trusts the orderer and does not need to confirm an order every time.

If the orderer is not a trusted orderer [104:no], then the party leader will approve or disapprove the order or select items within the order [106]. Otherwise, the orderer is "trusted" [104:yes]. Then, all (confirmed and/or approved) orders are sent to the establishment's server [110]. In the terminal solution, orders are sent directly to the establishment's in-house server. However, in the mobile device solution, the customer's orders are sent via the Internet to system support center's website, which then forwards the order electronically and automatically to the establishment's in-house server for processing. It may be possible for mobile devices to submit orders directly to the establishment's in-house server, but for security reasons, it is preferred that mobile device submit orders indirectly via the Internet to the support center's website.

The order is then "broken apart" and its individual items are added to a master item-processing list [120]. Depending on whether or not the item needs to be cooked or not [130], the path that the item then travels varies. We will first address the path that is taken when the item

requires cooking [130:yes], as the path that is taken when the item does not require cooking [130:no] is still followed once an item has been cooked.

If an item requires cooking [130:yes], then the item will be added to the chefs' processing list [140]. Then, based on the establishment's preference, items that are the same and which have not begun being cooked yet, can be grouped together or not grouped together for processing [150]. This grouping feature basically allows efficiencies to be recognized when several items, which are the same or have very similar cooking and/or preparation options, appear on the chef's processing list. By grouping same items together, they may be prepared or cooked in batch, which will save the chef preparation time, cooking time, and cleanup time than if each item were prepared and cooked individually in sequential, chronological order of time placed.

If the establishment's preference is to take advantage of the grouping feature [150:yes], then the same items will be grouped together to all be prepared and cooked at the same time [160]. Once items have been grouped or even if the grouping feature is not employed in the establishment [150:no], the system then determines which chef can cook the item [170], if so specified by the establishment, and which chef is available or less busy [180]. This will help the establishment in routing ordered items to the chef who is most able to cook a particular item and who is able to begin cooking the item first, thus reducing processing time further. Once the system has been determined that a particular chef is able to cook a particular item, the item is added to that particular chef's processing list (or assigned to that chef) [190]. Next, the item is sent to the chef's terminal for processing [200]. In situations where several chefs are sharing the same terminal, then the item will appear with the responsible chef's name next to it, or in a special listing showing items only for that particular chef. The chef will then select the item, verbally or manually by pressing the touch-screen, in his/her list that is ready to be cooked; doing so will indicate that the particular item is being prepared [210]. At this point, the item is marked as in process [230] and the chef begins to cook the item [260]. Once the item's status has been updated as in process, an optional notification is sent to the customer, informing him/her that the item is being prepared [250]. At the same time, the cost of the item is also added to the customer's bill [240]. Upon finishing cooking the item, the chef indicates that the item is ready, either verbally or manually by pressing the touch-screen [270]. The item's status will be updated to ready on the server [280] and is assigned a high priority [290].

At this point, the cooked item is then added to the staff's processing list [300]. It is also important to note that items, which did not require cooking [130:no], also follow the same step in that they are added to the staff's processing list [300]. Then the item's information is forwarded to the staff's terminal [310]. High priority items (e.g. item just cooked and need to be served while still hot) are moved to the top of the processing list [320]. Any available staff person may then select the item and specifies his/her name as the wait-staff handling the order [330]. The item is then registered in

the particular staff's processing list (or simply assigned to that wait-staff) [380]. Simultaneously, items that were not prepared by a chef [340:no] are marked as in process on the server [350]. Once this occurs, an optional notification is sent to the customer, informing him/her that the item is being prepared [370], and at the same time, the cost of the item is also added to the customer's bill [360]. While these events are occurring, the wait-staff begins to handle or prepare the item [390] (e.g. fix a salad or pick up a cooked dish from the kitchen). Once finished, the wait-staff then takes the item to the customer [400].

If the customer is paying by cash and the establishment requires payment upon delivering the item to the customer [403:yes], then the customer pays the establishment [405]. To make the payment transaction smoother and avoid dealing with change, the establishment may accept an even bill denomination payment and maintain a running balance for the customer. Then, upon checkout, if the customer has paid an excess amount, that amount will be refunded to him/her upon checkout. This is one way to ensure that customers paying with cash cannot "eat and run". Although not depicted in the diagram, to prevent "order and run" situations, the establishment may also configure the system such that this check and balance/payment be performed before orders are actually sent to the kitchen for processing (step 110). If the customer is not paying by cash and the establishment does not require payment from the customer upon delivery of the item [403:no], the process continues as follows.

The wait-staff updates his/her processing list on the terminal or device to indicate that the item has been serviced or completed [410]. Once this is done, the customer's order status and billing information is updated [420], and information indicating that the item has been completed is written to the establishment's log file [430].

Depending on the establishment's preferences, it may display a dialog or question to the customer when certain conditions are met (e.g. all items completed) or when a certain amount of time passes, whether or not the customer has finished all ordering; the customer may also specify on his or her own free will that he/she has finished all ordering or not [440]. If the customer has finished all ordering [440:yes], then the customer indicates that he/she has indeed finished all ordering [450]. Otherwise [440:no], the customer may proceed to begin the ordering process all over again, beginning with step 25.

FIG. 8.3.2 is a diagram depicting the receipt specification process logic. This logic begins by the system asking the customer if he/she needs a receipt [10]. If a receipt is not needed [10:no], then the system simply saves the customer's receipt preferences [40]. If a receipt is in fact needed [10:yes], then the system asks the customer what type of receipt is needed [20]. If an email receipt [20:email] or a printed and email receipt [20:print & email] is required, then the customer specifies the email address(es) to which he/she would like the receipt to be sent [30]. The system then saves

the customer's receipt preferences [40]. In the case the customer simply wants a printed receipt [20:print], then no other input is required and the system saves the customer's preferences [40].

FIG. 8.3.3 is a diagram depicting the discount (or promotion) and rewards points process logic. As the offering of discounts and/or promotions varies from establishment to establishment, a discount/promotion program is optional and depends on the preferences of the establishment [10]. If the establishment does not offer a discount/promotional program [10:no], the ensuing logic continues in the below section, entitled "*Reward Points Logic*". However, if the establishment does offer a discount/promotional program [10:yes], then the system asks the customer if he/she has a discount or promotional code [20].

If the customer does not have a discount or promotional code [30:no], the ensuing logic continues in the below section, entitled "*Reward Points Logic*". On the other hand, if the customer does have a discount or promotional code [30:yes], then he/she enters the discount or promotional code or, if previously saved and retrievable for the customer, selects the discount/promotion from a list [40]. Next, the system saves the customer's discount/promotion information [50], and displays the discount or promotion that will be applied to his/her order [60].

Reward Points Logic

The preferred embodiment of the system is to include the rewards point feature. However, given the complexity and the fact that many establishments may have their own reward system currently in place, it may not be included. Regardless, the logic has been included and it most likely will be implemented in the overall system.

If the system does not include the reward points feature [70:no], then the logic continues as specified in the below section, entitled "*Continue*". However, if the system does in fact include the reward points feature [70:yes], then a check must be performed to see whether the establishment has or offers a reward points program [80]. If the establishment does not offer a reward points program [80:no], then the logic continues as specified in the below section, entitled "*Continue*". Otherwise [80:yes], the system checks to see which device the customer is using to access the system [90].

In the case that the customer is using a mobile device [90:mobile], then the ensuing logic continues in the below section, entitled "*Sufficient Reward Points Logic*". If the customer is accessing the system from a terminal [90:terminal], then the system must see if it can determine the customer's reward points account information from when he/she logged into the system, in fact

he/she is logged in [100]. Customers, who are using mobile devices, will automatically have their reward points information stored because all mobile users are required to register for a system account in order to use the system. However, customers using terminal to access the system are not required to have registered for a system account. It may be possible to use a customer's cashless payment medium information, as a type of system account, to store his/her reward points information on the system. However, if this is not possible, then users of the terminal will be required to have a system or special points reward card in order to record their reward points information.

If the customer's reward points account information is able to be determined from his/her cashless payment medium [100:yes], then the ensuing logic continues in the below section, entitled "*Sufficient Reward Points Logic*". Otherwise, if not [100:no], then the system will ask the customer if he/she has a system/reward points card, account, or related information [110].

If the customer does not have a system/rewards point card/account/information [120:no], then the logic continues as specified in the below section, entitled "*Continue*". Otherwise [120:yes], the customer then inputs/swipes/transfers his/her reward points card, account, or its related information to the terminal [130].

Sufficient Reward Points Logic

The system then determines if the customer has a sufficient number of points, as determined by the establishment's preferences in accordance with their own customized reward points program, to receive a reward [140]. The type of reward offered varies according to the establishment's preferences and may include, but not limited to, a discount on the customer's bill or awarding complimentary order items to the customer. Fundamentally, reward points from one establishment will not be redeemable at another establishment, unless the establishment specifies otherwise, the establishments are part of a national or international chain, or establishments have entered into a partnership together to honor one another's reward points.

If the customer does not have enough points for a reward [150:no], then the logic continues as specified in the below section, entitled "*Continue*". However, if the customer does have enough points [150:yes], then the system will ask the customer if he/she would like the system to show his/her reward [160]. It is noted that the reason why the system asks the customer if he/she would like to "show" his/her reward is because it is quite possible that the customer may be with a party and may not necessary want others to see the reward that he/she has received. In other words, the customer may have accumulated points on his/her own and may want to show/use the reward at a time of his/her choosing, and not necessarily when with others. This is simply a small measure to

maintain the customer's privacy and allow him/her to decide if/when to show and use the reward. It may be possible for the customer to override this check if he/she changes his/her system settings/preferences.

In the case that the customer chooses not to show his/her reward [170:no], then the logic continues as specified in the below section, entitled "*Continue*". Otherwise, if yes [170:yes], the system will display the reward [180] and ask the customer if he/she would like to use the reward [190]. It is possible, for one reason or another, that the customer may not wish to use the reward at the present time. However, the system will and the customer must also take into consideration any time limits set upon the reward by the establishment.

If the customer decides not to use the reward [200:no], then the logic continues as specified in the below section, entitled "*Continue*". Otherwise [200:yes], the system will apply the reward to the customer's order [210].

Continue

The process logic returns to the diagram that referenced this process logic diagram.

FIG. 8.3.4 is a diagram depicting the process logic for updating a customer's reward points.

The preferred embodiment of the system is to include the rewards point feature. However, given the complexity and the fact that many establishments may have their own reward system currently in place, it may not be included. Regardless, the logic has been included and it most likely will be implemented in the overall system.

If the system does not include the reward points feature [10:no], then the logic continues as specified in the below section, entitled "*Continue*". However, if the system does in fact include the reward points feature [10:yes], then a check must be performed to see whether the establishment has or offers a reward points program [20]. If the establishment does not offer a reward points program [20:no], then the logic continues as specified in the below section, entitled "*Continue*". Otherwise [20:yes], the system checks to see which device the customer is using to access the system [30].

In the case that the customer is using a mobile device [30:mobile], then the ensuing logic continues in the below section, entitled "*Saving Reward Points Logic*". If the customer is accessing the system from a terminal [30:terminal], then the system must determine if the customer previously

input/swiped/transferred a card, account, or related information that contained his/her reward points information [40].

If the system did previously obtain the customer's reward points information [40:yes], then the ensuing logic continues in the below section, entitled "*Saving Reward Points Logic*". Otherwise [40:no], then the logic continues as specified in the below section, entitled "*Continue*".

Saving Reward Points Logic

The system saves the customer's reward points that were accumulated for his/her current visit [50].

Continue

The process logic returns to the diagram that referenced this process logic diagram.

FIG. 8.3.5 depicts the process logic of the dynamic selling feature of the system. This process begins with the staff person selecting the dynamic selling option on his/her terminal [10]. Next, the staff person selects or inputs the item [20], which is to be sent dynamically (in real-time or near real-time) to all the devices that are currently in use at the establishment. In the next step, the staff person inputs the number of items to be offered (or quantity limit), the time limit (if applicable), and any other necessary options [30]. After the staff indicates that he/she is finished [40], the system will display the dynamic selling information for the specified item [50]. If the information is not acceptable to the staff person [60:no], then he/she can modify the information [70] and steps 50-60 are repeated. However, if the staff person confirms that all the information is correct [60:yes], the system then checks the devices that the logged-in customers are using at the establishment [80].

If the customer is using a terminal [80:terminal], then the ensuing logic continues in the below section, entitled "*Send Dynamic Selling Information*". In the case that the customer is using a mobile device [80:mobile], then the system will check the registered customer's device configuration information to determine if it is a messaging-aware device or if the program/technology supports messaging [90]. For purposes of this disclosure, "Messaging-aware" means that the mobile device and/or the program/technology deployed on the device allows it to receive asynchronous (one-way) messages/information from the server without first having to make a request (from the device to the server – synchronous) for messages/information.

In the situation where the customer's mobile device is truly messaging-aware [90:yes], then the ensuing logic continues in the below section, entitled *"Send Dynamic Selling Information"*. Otherwise, if the customer's mobile device does not support messaging [90:no], then the system will check the customer's system preferences to see if he/she allows "polling" [100]. Polling is a technique used for devices that are not truly messaging-aware whereby the client (in this case, the customer's mobile device) accesses the server at a certain time interval to see if there are any messages/information available for the client/device.

If the customer has not enabled the polling feature for his/her mobile device [100:no], then the ensuing logic continues in the below section, entitled *"Store Item Information Temporarily"*. However, if the customer has enabled his/her device for polling [100:yes], then two actions occur simultaneously. One action is described in the below section, entitled *"Store Item Information Temporarily"*. The other action is that the program on the mobile device checks itself to see if the polling interval (to check the server for messages) has been reached [105]. If the polling feature on the mobile device has been activated previously, then the device is actually polling the server already at time intervals specified by the customer in his/her system preferences.

If the polling interval has been reached [105:yes], then the ensuing logic continues in the below section, entitled *"Device Contacts Server"*. Otherwise, if the polling interval has not been reached [105:no], then the program on the mobile device waits a certain amount of time and then checks again to see if the polling interval has been reached [105].

Store Item Information Temporarily

The system stores the information for the dynamic selling item in the customer's polling queue on the server [110] until he/she next access the server. Almost any action the customer makes on his/her mobile device will need to contact the server. As such, the next time the customer accesses the system, which makes a call to the server that is holding the dynamic selling item information for the customer [110:customer access], the logic proceeds with that described in the below section, entitled *"Device Contacts Server"*.

Device Contacts Server

When the customer's mobile device contacts the server [113], the system checks to see if the dynamic selling item is still valid [116]. The validity check is important as the dynamic selling item may have an available quantity or time limit restriction placed on it by the staff person. As a result, the system needs to make sure that the item is still available for dynamic selling.

In the event that the dynamic selling item is no longer valid [120:no], then the system will notify the customer of such and the process ends [125]. Otherwise, if the item is still available [120:yes], the ensuing logic continues in the below section, entitled "*Send Dynamic Selling Information*".

Send Dynamic Selling Information

The server sends the information regarding the dynamic selling item to the device [130]. After the staff person has confirmed the dynamic selling item's information (previously described), all messaging-capable devices receive this information. However, as described above, non-messaging-capable devices may or may not receive the information, if the dynamic selling item is no longer valid/available.

Next, the information for the dynamic selling item is displayed on the appropriate device (terminal or mobile device) [140]. If the customer does not wish to order the item [150:no], then the system returns the customer to the previous screen that he/she was viewing [160] and the dynamic selling process logic ends.

In the case that the customer is interested in ordering the item [150:yes], then he/she selects the item quantity (if possible; the staff person may have specified that the item is limit one per customer) and specifies for whom the item is for (optional), preparation options, and any other necessary information [170]. Next, the customer selects the send option on the device that he/she is using [180], and the system sends the order to the server [190].

Since the dynamic selling feature is basically first-come-first-serve, it is possible that other customers may have been first to claim the item since a customer sent the dynamic selling item's order to the server. As such, the system (again) needs to check if the dynamic selling item is still valid/available [200].

If the item is not available [200:no], then the system notifies the customer of the item's availability status [210], in this case, that the item is unfortunately no longer available. However, in the event that the dynamic selling item is available [200:yes], then two actions occur simultaneously. One, the system notifies the customer of the item's availability status [210]. In this case, the customer is notified that his/her order for the item has been accepted. The other action that occurs is the execution of steps 104-430 in the Order Processing Logic of FIG. 8.3.1 [220].

In accordance with the detailed descriptions of the present invention in the above sections, the main advantages are that the system: makes use of hardware devices, namely internet-capable,

mobile devices and specially designed thin terminals, that are optimal for use at food service establishments and that customers can use to place orders wirelessly without staff intervention; provides a complete order processing solution, addressing order placement, fulfillment, and payment settlement; is cost effective, in that the system is built upon primarily open-source software such as Linux; is reliable, in that the server implements fault-tolerance and redundancy, and that establishments' critical data is backed up frequently off-site and its systems constantly monitored for errors; is secure, in that a visit code is used to ensure that customers placing orders are actually present at the establishment and that sensitive communications and data are always encrypted; makes establishments' operations more efficient by splitting orders to be directed to either the staff or the chef(s) and by grouping similar order items in the wait queue to be processed together; significantly reduce customer wait times since the customer no longer needs to wait for a staff person to 1) present him/her with a menu (restaurant setting), 2) take his/her order, and 3) process payment, in addition to the speed gained from other recognized efficiencies; further reduce wait times and increase table turnover by offering customers the ability to browse/pre-order while waiting; improve customer service and the customer's overall experience at food service establishments since customers spend less time waiting and some staff's responsibilities can be re-assigned to ensure that customers are satisfied and have no questions nor concerns; alleviate establishments' concerns over labor shortage and cost since the system will be able to handle some of the roles previously performed by overworked and understaffed employees; consolidate customers' management of reward points in a single place; and allow more sales opportunities for establishments to dynamically promote and/or reduce inventories of certain items.

The descriptions and examples, given above, should not be interpreted as limitations on the possible scope of the invention. As other variations are feasible, the scope of this invention is determined by the claims and their legal equivalents.

CLAIMS

1. An interactive system for controlling menu orders placed by customers at a food service establishment comprising:

at least one ordering device for customers to place said orders themselves by adding menu items to said orders;

at least one server for processing and forwarding said orders;

means for wirelessly transmitting said orders from said device to one or more food preparation areas of said food service establishment;

means for tracking said order's information and payment status;

whereby said menu orders include food, drink, and other related items

whereby said ordering device is a thin, touch-terminal, or a mobile device, both with built-in screen, data input means, ability to transmit data wirelessly, and self-sufficient, cordless power supply; and

whereby said system provides the means for accepting customer payment of said orders via said terminal or said mobile device using a cashless payment medium

2. The system of claim 1 wherein said cashless payment medium comprises, but is not limited to, credit cards, debit cards, smart cards, pre-paid cards, or additionally for said customers using said mobile device, payment mechanism of said customer's mobile phone gateway, internet access provider, or a third party payment provider.

3. The system of claim 1 further comprising means for adding said menu items to said order by selecting from a text or graphical list of said menu items.

4. The system of claim 1 further comprising means for adding said menu items to said order using said mobile device by entering an item code corresponding to said menu item.

5. The system of claim 1 further comprising means for identifying the individual leader of the dining party who will pay for the meal and control ordering.

6. The system of claim 1 further comprising means for consolidating a customer's reward points and means by which discounts, coupons and promotions can be redeemed through said terminal or said mobile device.

7. The system of claim 1 further comprising means by which a customer can browse and pre-order menu items using said mobile device or a second said terminal.

8. The system of claim 1 further comprising means by which a customer can automatically retrieve seating availability and can reserve seating in said food service establishment.

9. The system of claim 1 wherein said terminal further includes access to a global computer network such that the end user can access such items as Internet web pages, news, entertainment, and other information.

10. The system of claim 1 further comprising means for providing said customers with menu updates as well as special discounts and offers on menu items in real-time.

11. The system of claim 1 further comprising means for generating a paper and/or electronic receipt, the latter which may be emailed or sent electronically to said customer or other destination specified by said customer.

12. The system of claim 1 further comprising means for facilitating the payment of tips and gratuities.

13. The system of claim 1 further comprising means of the submission of customer feedback and ratings.

14. The system of claim 1 further comprising means for displaying screens in accordance with a specified language preference.

15. The system of claim 1 further comprising means for said food service establishment to process cash payments.

16. The system of claim 1 further comprising means for splitting apart said orders and sending individual menu items within said order to said terminal of staff person most appropriate for processing said individual menu item.

17. The system of claim 1 further comprising means for grouping the same said individual menu items, which have not yet begun to be handled by said staff person, to be processed in batch.

18. A customer-based, interactive system for controlling menu orders placed by customers at a food service establishment comprising:

at least one battery-powered terminal affixed to a table of said establishment comprising a data input device, including a touch-activated monitor, electronically connected to the terminal for displaying a set of data, which is accessible from a central server and which corresponds to menu items;

whereby said menu orders include food, drink, and other related items

means for wirelessly transmitting said menu orders to said food service establishment from said terminal, and routing individual menu items within said menu order to the appropriate areas of said food service establishment for processing;

means affixed to the terminal for accepting payment wherein said means accommodates credit cards, debit cards or other cashless payment mediums; and

means by which coupons and premiums can be offered and accepted by the system and tabulated into the final bill.

19. The system of claim 18 further comprising a second terminal at which an end user can peruse menu items and pre-order a meal and determine seating availability.

20. The system of claim 18 further comprising means for coordinating the seating of parties across various tables.

21. The system of claim 18 further comprising means for identifying an individual leader of the dining party, who is responsible for paying for the meal and approving the ordering of menu items.

22. The system of claim 18 wherein said terminal further includes access to a global computer network such that the end user can access such items as Internet web pages, news, entertainment, and other information.

23. The system of claim 18 further comprising means for providing said customers with menu updates as well as special discounts and offers on menu items in real-time.

24. The system of claim 18 further comprising means for said food service establishment to process cash payments.

25. A customer-based, interactive system for controlling menu orders placed by customers at a food service establishment comprising:

at least one battery-powered terminal, affixed to a dining food table of said food service establishment and which includes a data input device and further comprises a touch-activated monitor, electronically connected to the terminal, for displaying a set of images, which are digitally accessible and which correspond to menu items;

means for alerting said food service establishment when said terminal is inoperable or battery of said terminal needs to be recharged;

means for identifying the individual leader of the dining party who will pay for said orders and approve the ordering of said menu items;

means for wirelessly transmitting said menu orders to said food service establishment from said terminal, and routing individual said menu items within said menu order to the appropriate areas of said food service establishment for processing;

means affixed to the terminal for accepting payment wherein said means accommodates credit cards, debit cards or other cashless payment systems; and

means by which coupons and premiums can be offered and accepted by the system and tabulated into the final bill;

whereby said menu orders include food, drink, and other related items.

26. The system of claim 25 further comprising means for said food service establishment to process cash payments.

27. An interactive system for customers to place and pay for menu orders by themselves at a food service establishment comprising:

at least one customer-owned, wireless mobile communication device;

at least one server for processing and forwarding said orders;

means for wirelessly transmitting said orders from said mobile communication device to said at least one server, which routes said orders to one or more food preparation areas of said food service establishment;

means for tracking said order's information and payment status;

whereby said menu orders include food, drink, and other related items

whereby said orders are placed via said mobile communication device by adding menu items to said orders by either inputting said menu item's code or selecting said menu item from textual or graphical lists displayed on said mobile communication device

whereby said orders are paid for via said mobile communication device by forwarding the customer's cashless payment medium information to said server for processing, by charging said customer's account with said customer's mobile phone gateway provider, or by processing the payment via a third-party payment provider.

28. The system of claim 27 wherein said cashless payment medium comprises, but is not limited to, credit cards, debit cards, smart cards, pre-paid cards.

29. The system of claim 27 further comprising means for identifying the individual leader of the dining party who will pay for the meal and control ordering.

30. The system of claim 27 further comprising means for consolidating a customer's reward points and means by which discounts, coupons and promotions can be redeemed through said mobile communication device.

31. The system of claim 27 further comprising means by which a customer can browse and pre-order menu items using said mobile communication device.

32. The system of claim 27 further comprising means by which a customer can automatically retrieve seating availability and can reserve seating in said food service establishment.

33. The system of claim 27 further comprising means for providing said customers with menu updates as well as special discounts and offers on menu items in real-time.

34. The system of claim 27 further comprising means for generating a paper and/or electronic receipt, the latter which may be emailed or sent electronically to said customer or other destination specified by said customer.

35. The system of claim 27 further comprising means for facilitating the payment of tips and gratuities.

36. The system of claim 27 further comprising means of the submission of customer feedback and ratings.

37. The system of claim 27 further comprising means for said food service establishment to process cash payments.

38. The system of claim 27 further comprising means for splitting apart said orders and sending individual menu items within said order to said terminal of staff person most appropriate for processing said individual menu item.

39. The system of claim 27 further comprising means for grouping the same said individual menu items, which have not yet begun to be handled by said staff person, to be processed in batch.

40. An interactive system for customers to place and pay for menu orders by themselves at a food service establishment comprising:

at least one customer-owned, wireless mobile phone device;

at least one server for processing and forwarding said orders;

means for wirelessly transmitting said orders from said mobile phone device to said server at least one, which routes said orders to one or more food preparation areas of said food service establishment;

means for tracking said order's information and payment status;

whereby said menu orders include food, drink, and other related items

whereby said orders are placed via said mobile phone device by adding menu items to said orders by either inputting said menu item's code or selecting said menu item from textual or graphical lists displayed on said mobile phone device

whereby said orders are paid for via said mobile phone device by forwarding the customer's cashless payment medium information to said server for processing, by charging said customer's account with said customer's mobile phone gateway provider, or by processing the payment via a third-party payment provider.

41. The system of claim 40 wherein said cashless payment medium comprises, but is not limited to, credit cards, debit cards, smart cards, pre-paid cards.

42. The system of claim 40 further comprising means for consolidating a customer's reward points and means by which discounts, coupons and promotions can be redeemed through said mobile phone device.

43. The system of claim 40 further comprising means by which a customer can browse and pre-order menu items using said mobile phone device.

44. The system of claim 40 further comprising means for said food service establishment to process cash payments.

45. System logic for splitting apart orders and sending individual menu items within said order to said terminal of staff person comprising a system appropriate for processing said individual menu item, and means for grouping the same said individual menu item, which have not yet begun to be handled by said staff person, and which will be processed in batch.

46. A terminal device comprising:

a self-sufficient, battery power source;

a touch-activated screen for user input;

a cashless payment medium input mechanism;

a mechanism for wirelessly transferring data to other devices;

whereby said battery power source is comprised of two batteries to extend the operating time of said terminal device;

whereby said terminal device is able to continue operating without interruption while one of the two said batteries of said battery power source is replaced;

whereby said terminal device provides security mechanisms and other design enhancements to prevent unauthorized access and to allow said terminal device to be used in a public environment without concern for components of said terminal device being stolen;

whereby said cashless payment medium comprises, but is not limited to, credit cards, debit cards, smart cards, pre-paid cards.

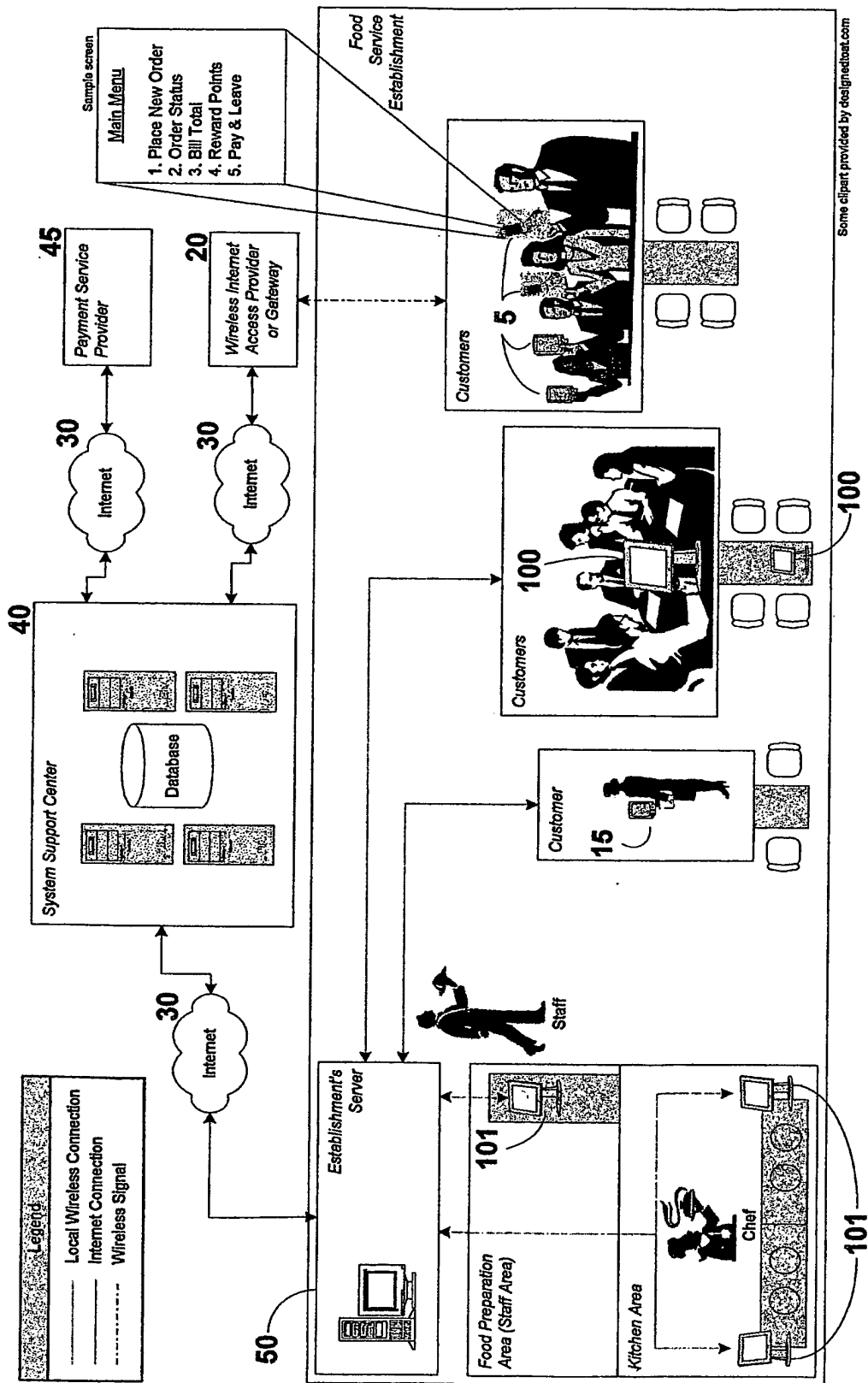


FIG. 1.0.1

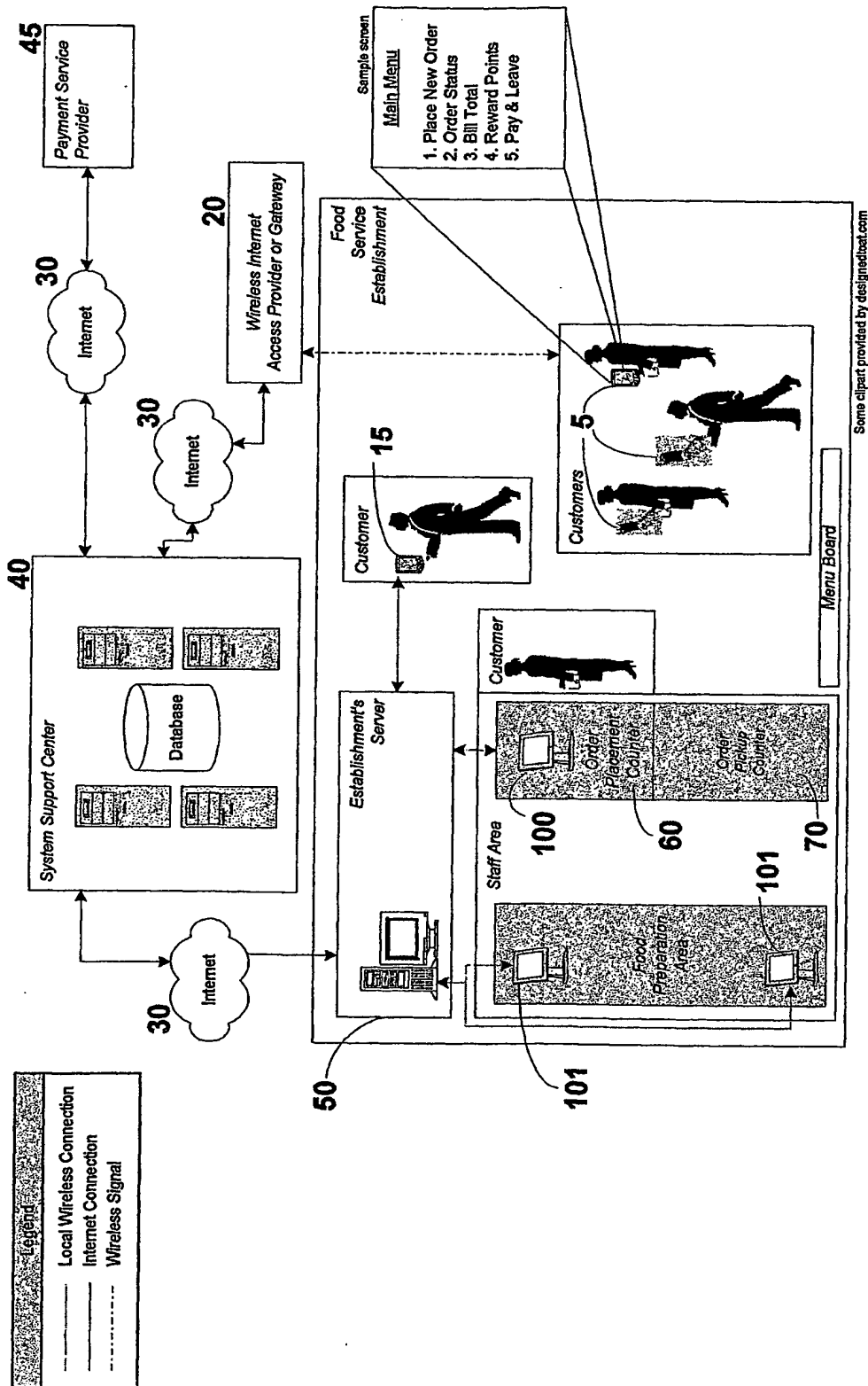


FIG. 1.0.2

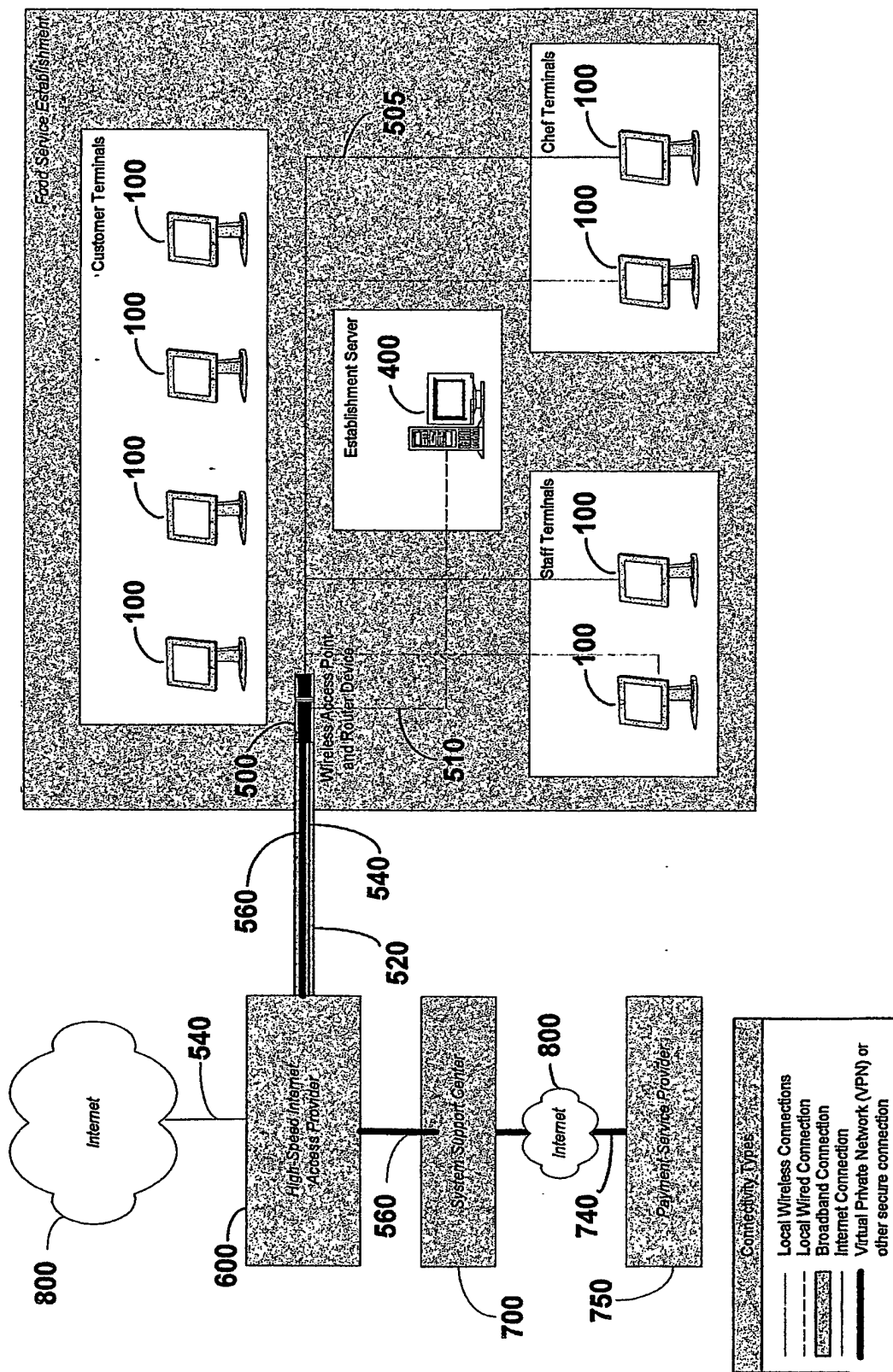


FIG. 2

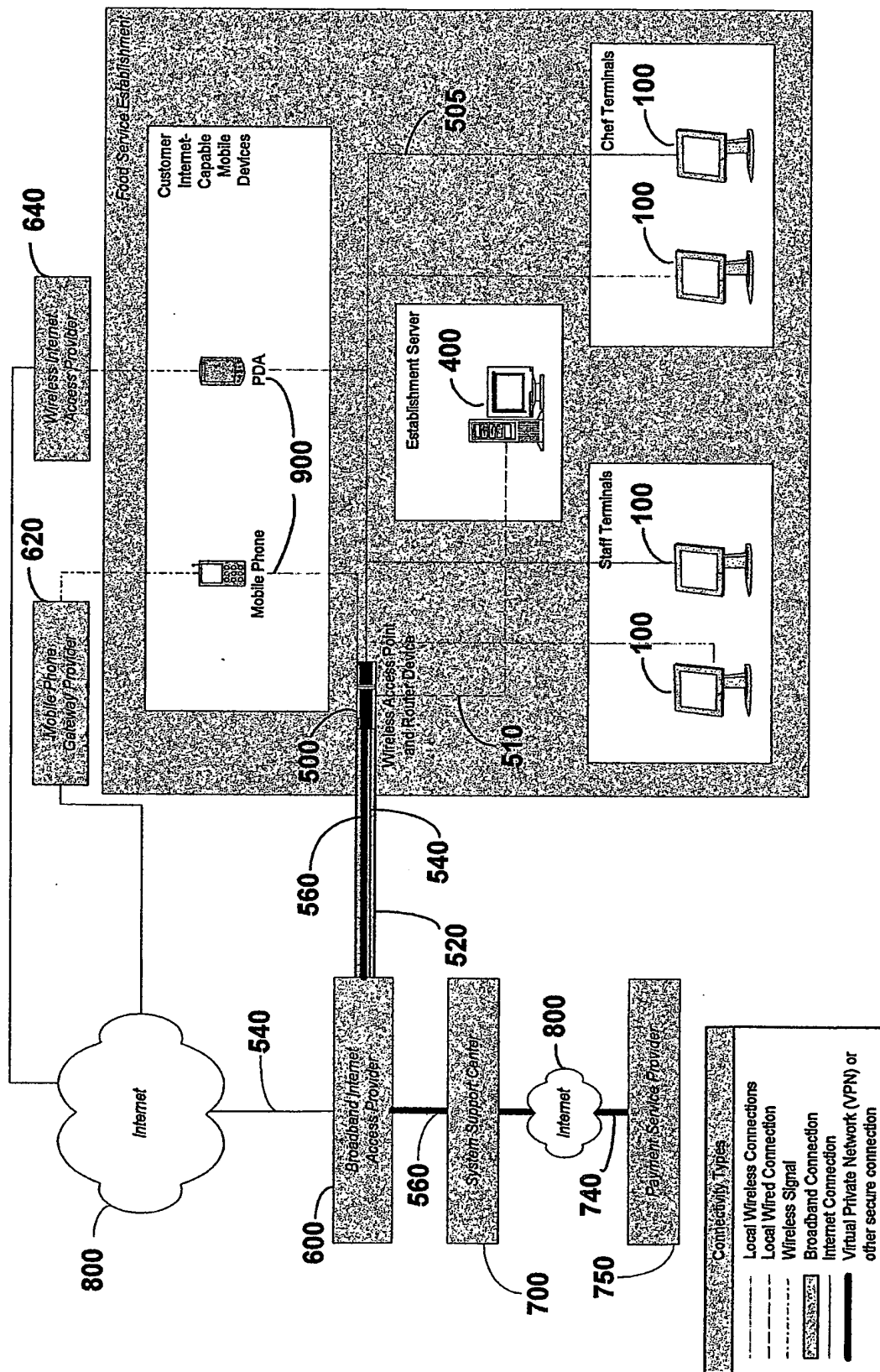


FIG. 3

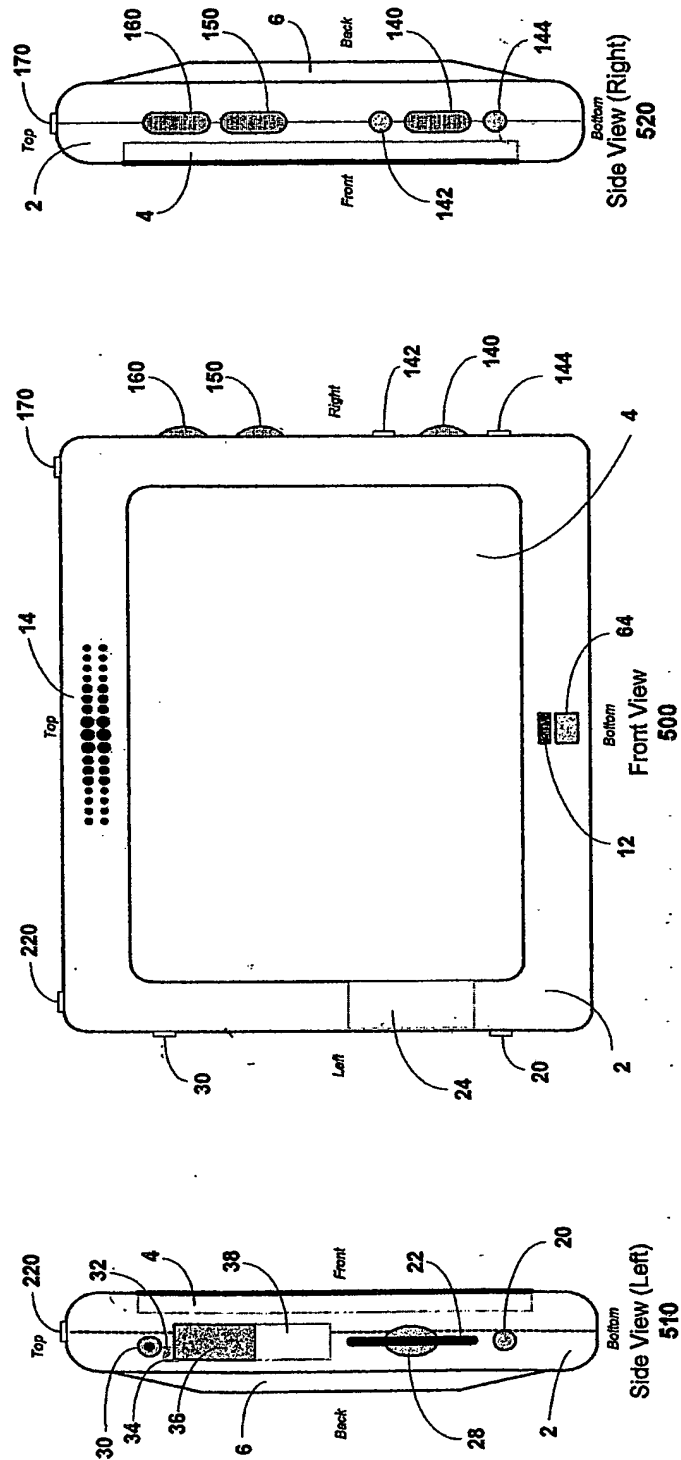


FIG. 4.1

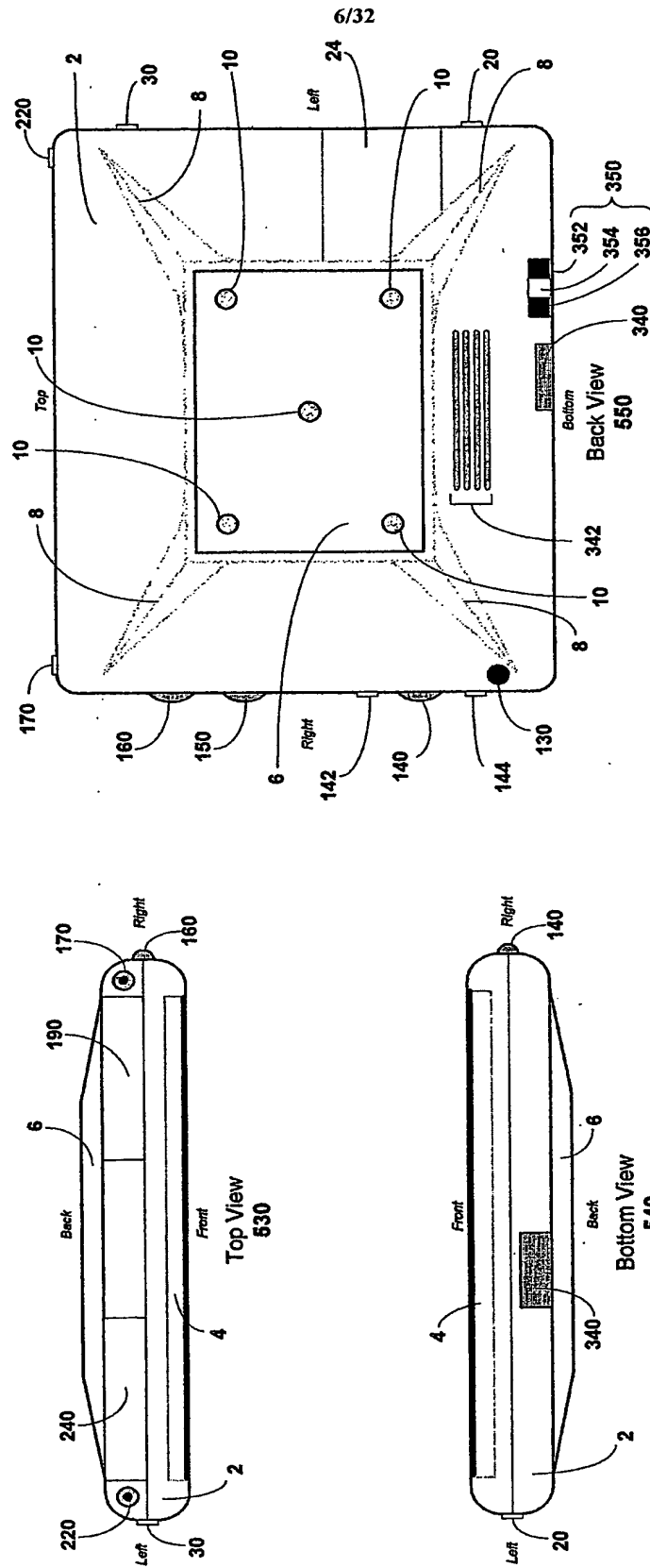


FIG. 4.2

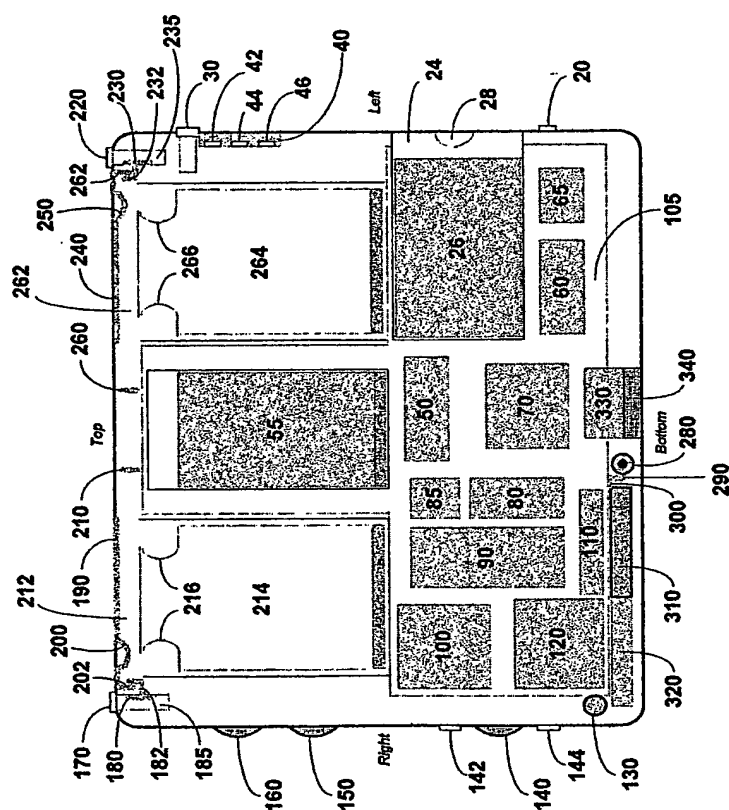


FIG. 5

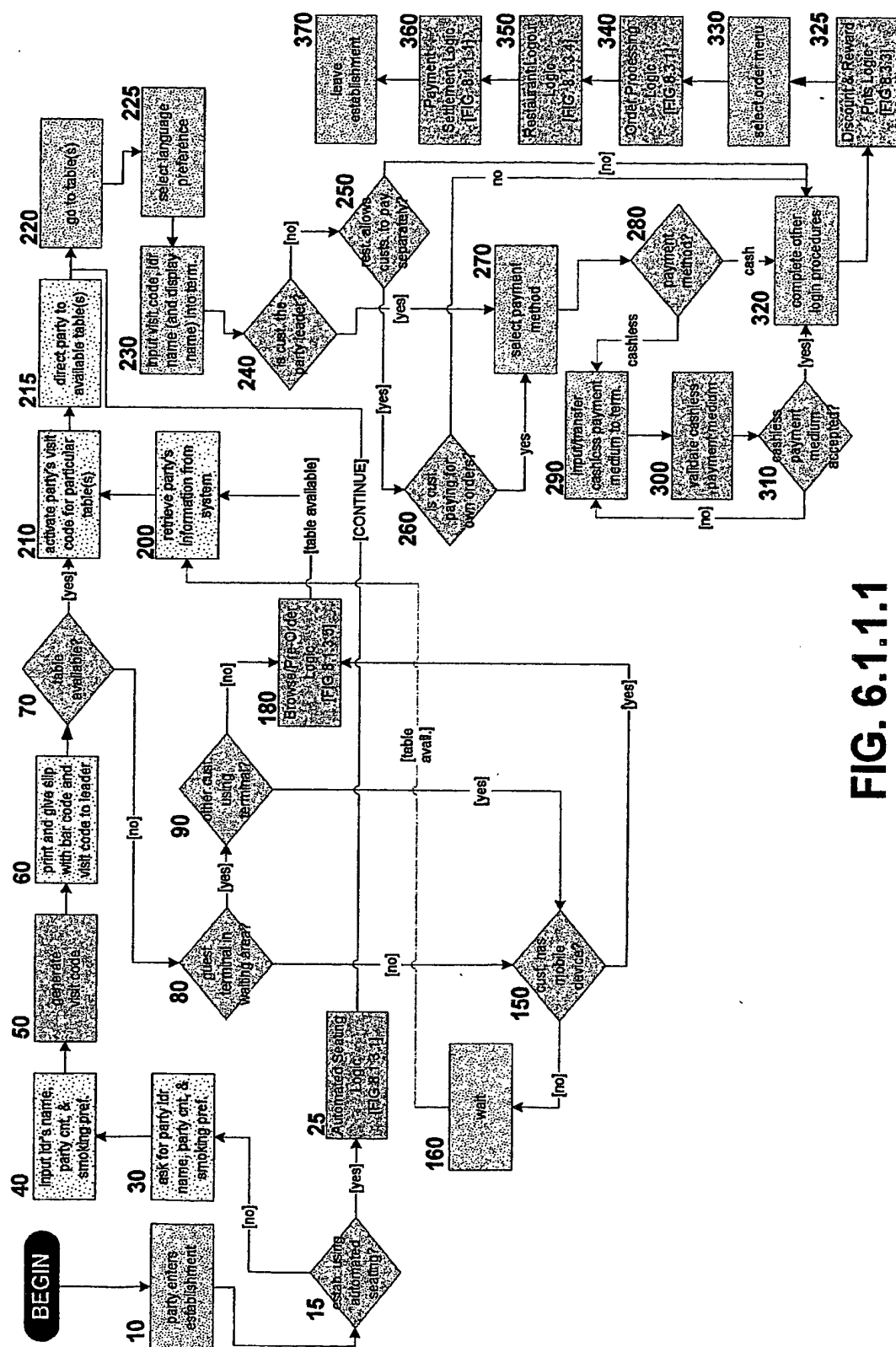


FIG. 6.1.1.1

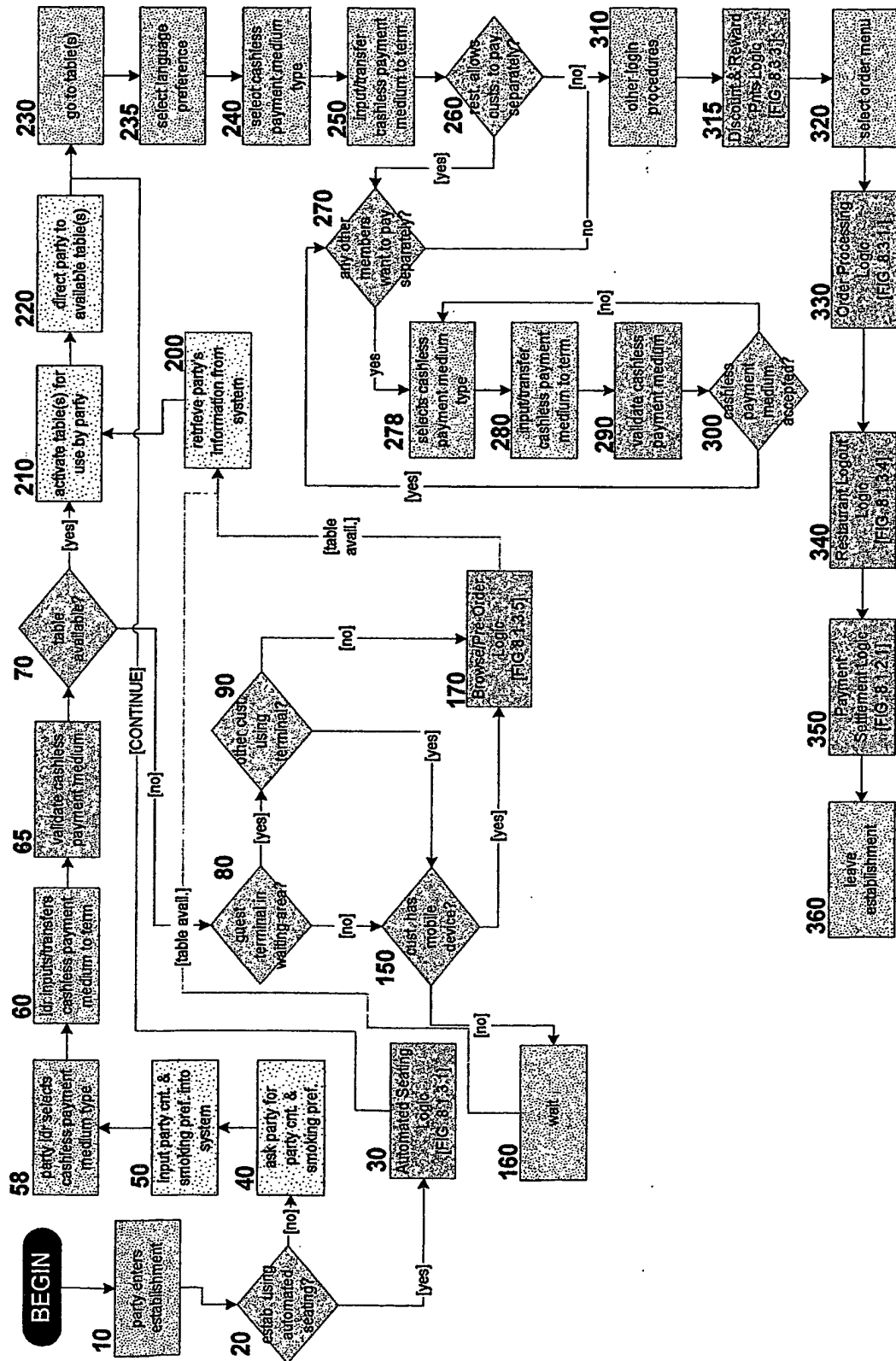


FIG. 6.1.2.1

Sat, Jan 5, 2002
3:40 pm

New Order

View Orders

Bill

Settings

Establishment Info

Help

Finish

News

Weather

Internet

Advertisement

Welcome to our establishment. Please choose an item to add to your order.

Specials

Appetizers

Main Dishes

Desserts

Drinks

Recommended

Beef

Chicken

Pork

Pasta

Teriyaki Chicken...

\$12.99

Info

Order

Teriyaki Chicken

Main Ordering Screen

FIG. 6.1.3.1

Select your language

English

Espanol

Japanese

Deutsche

Francais

Visit Code

Leader Name

Name

Continue

Login Screen

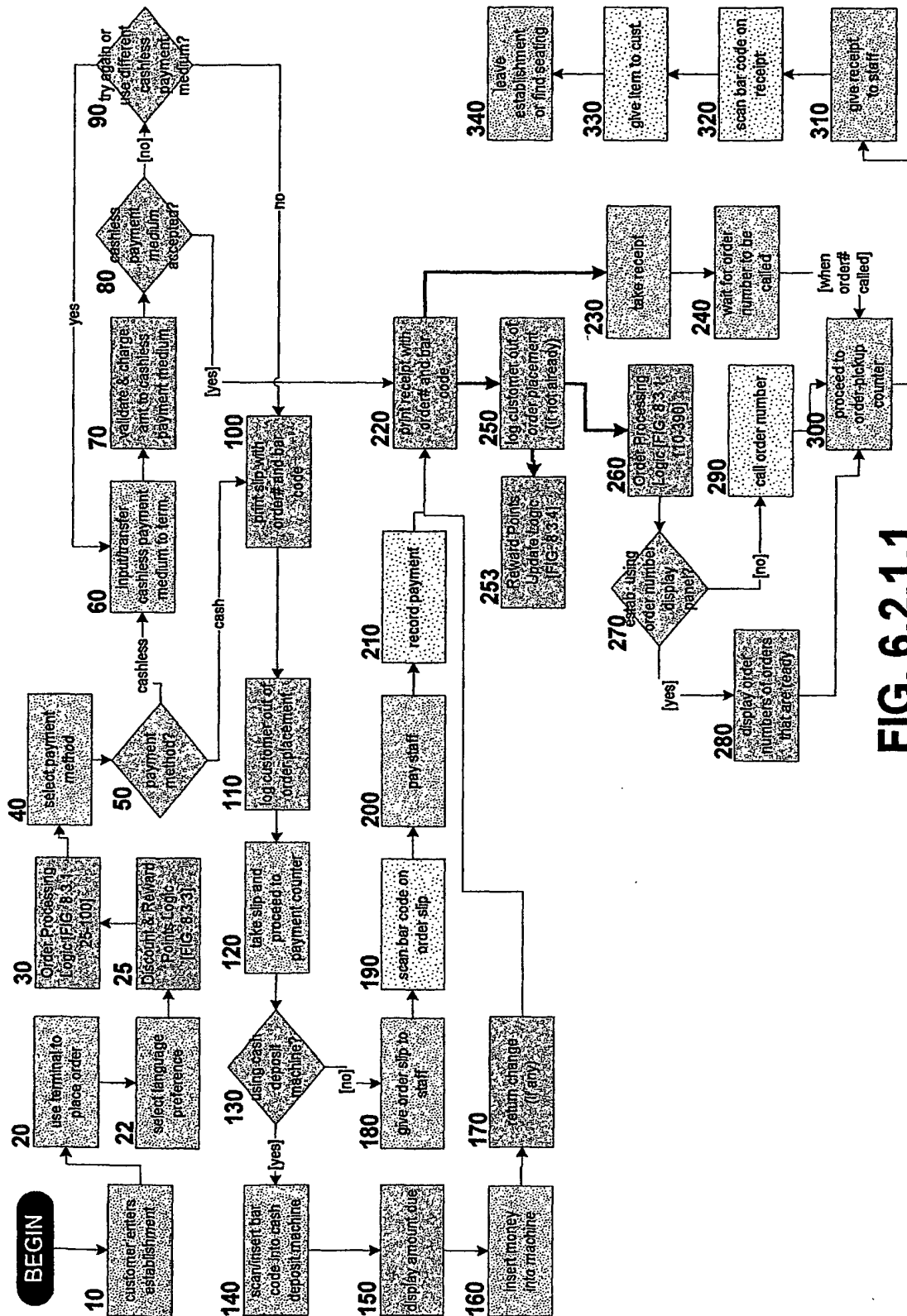


FIG. 6.2.1.1

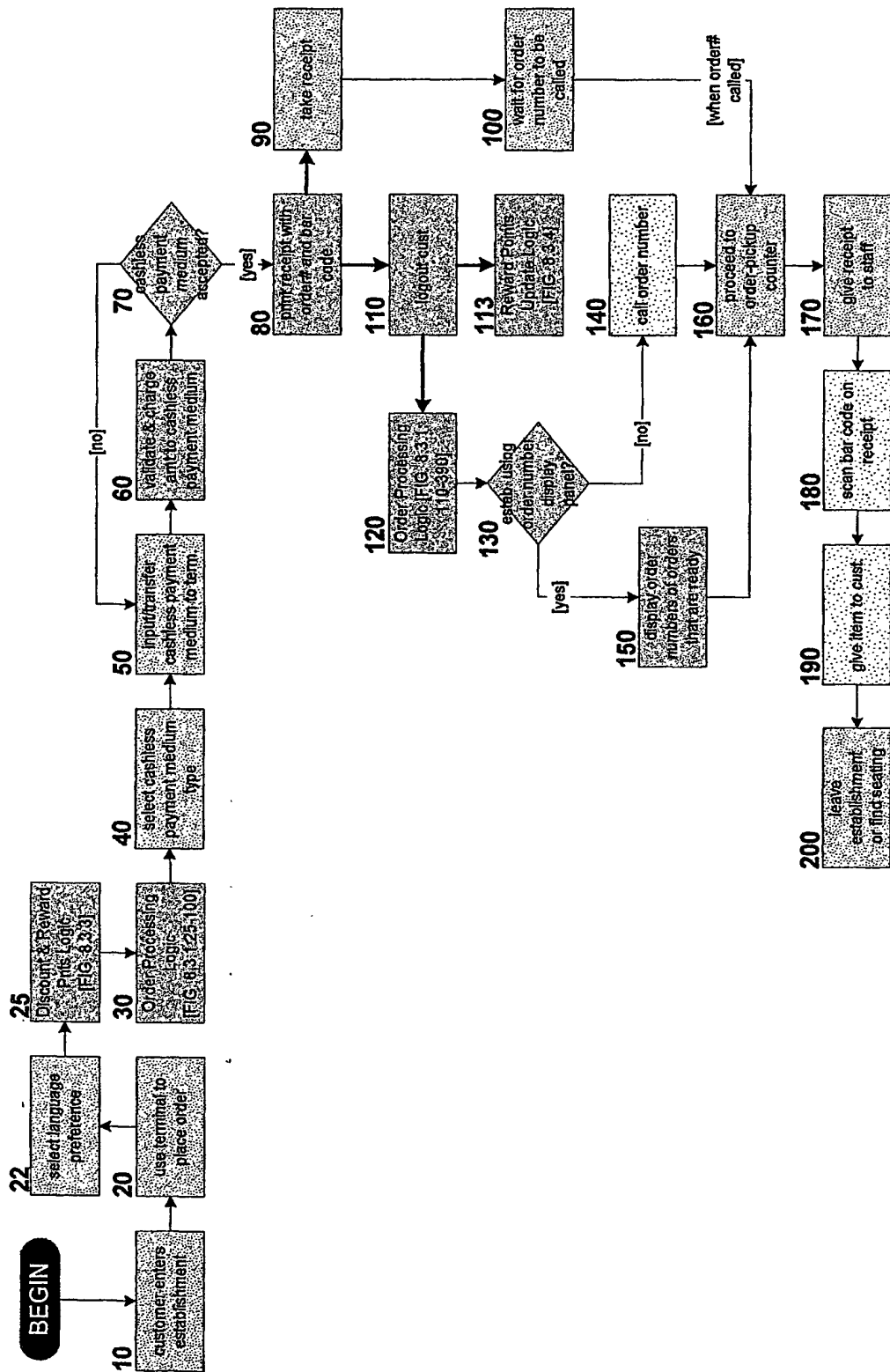


FIG. 6.2.2.1

To add an item to your order, select it below and press the "Add Item To Order" button...

DrinksFoodOther

SpecialsCold DrinksHot DrinksOther

Cafe Latte...\$2.25 / \$2.75 / \$3.25

Cafe Latte

More InfoAdd Item to OrderView OrderFinish and PayHelp

Main Ordering Screen

FIG. 6.2.3.1

Select your language

EnglishEspañolJapaneseDeutschFrançais

Login Screen

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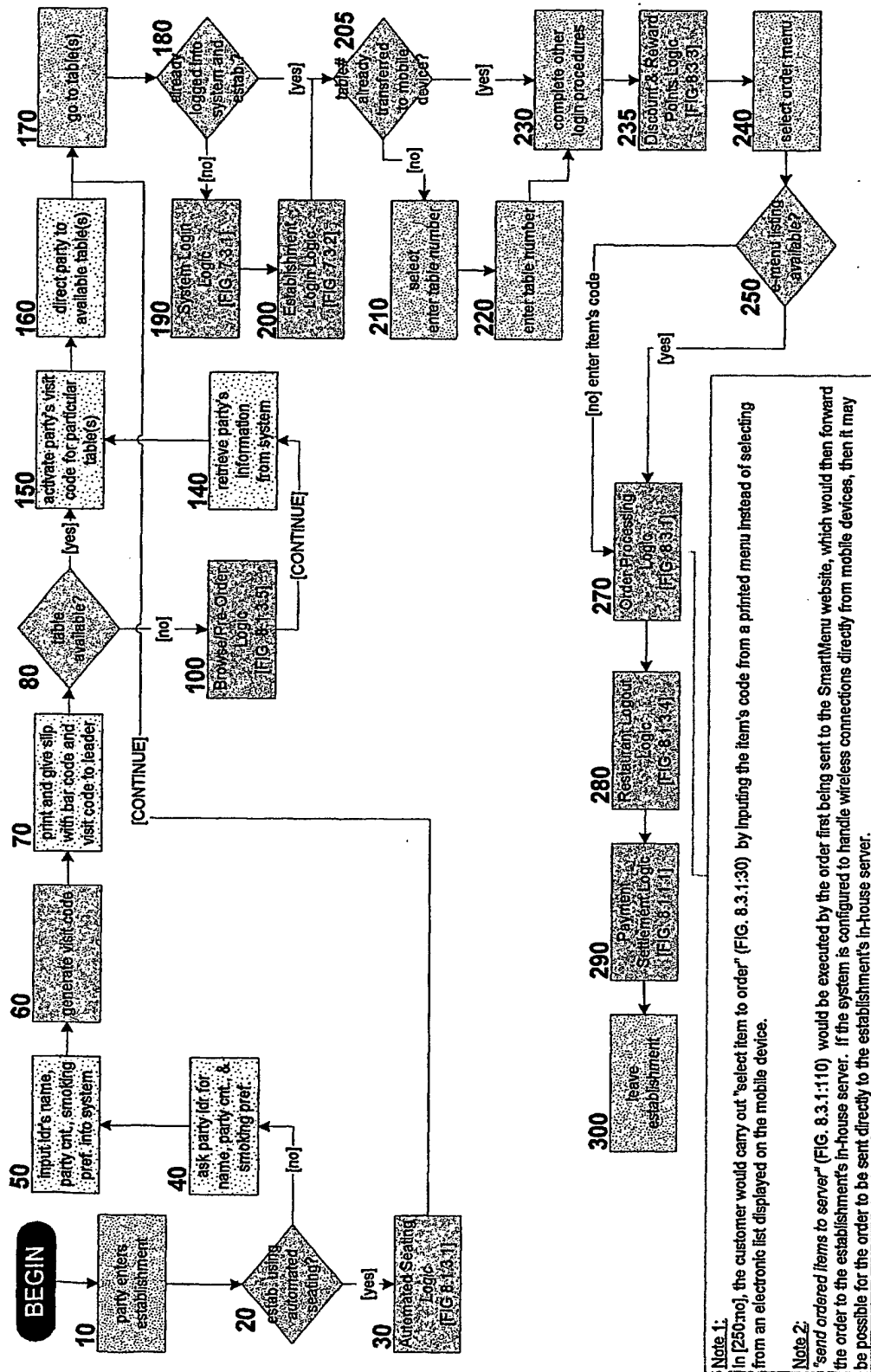


FIG. 7.1.1.1

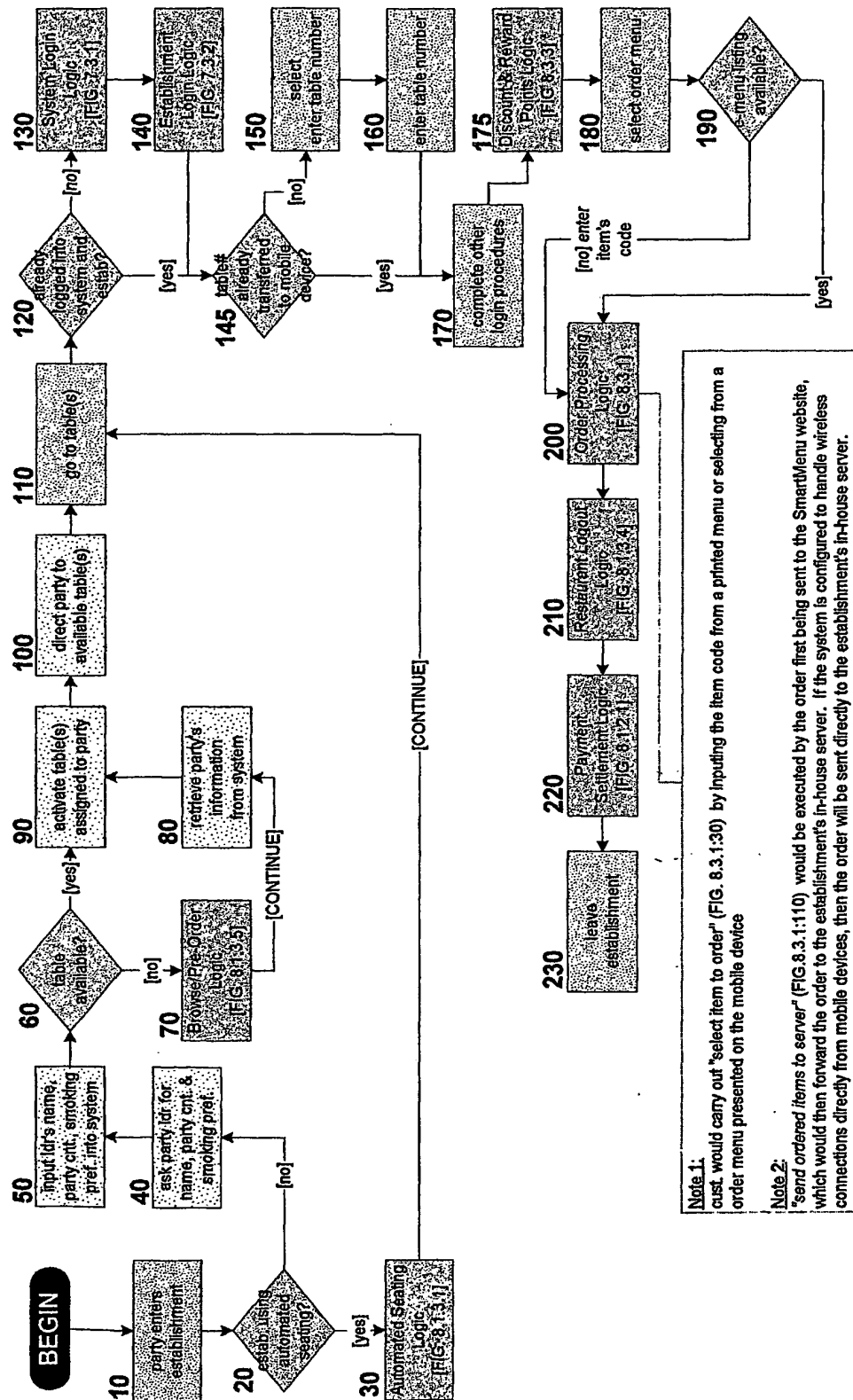


FIG. 7.1.2.1

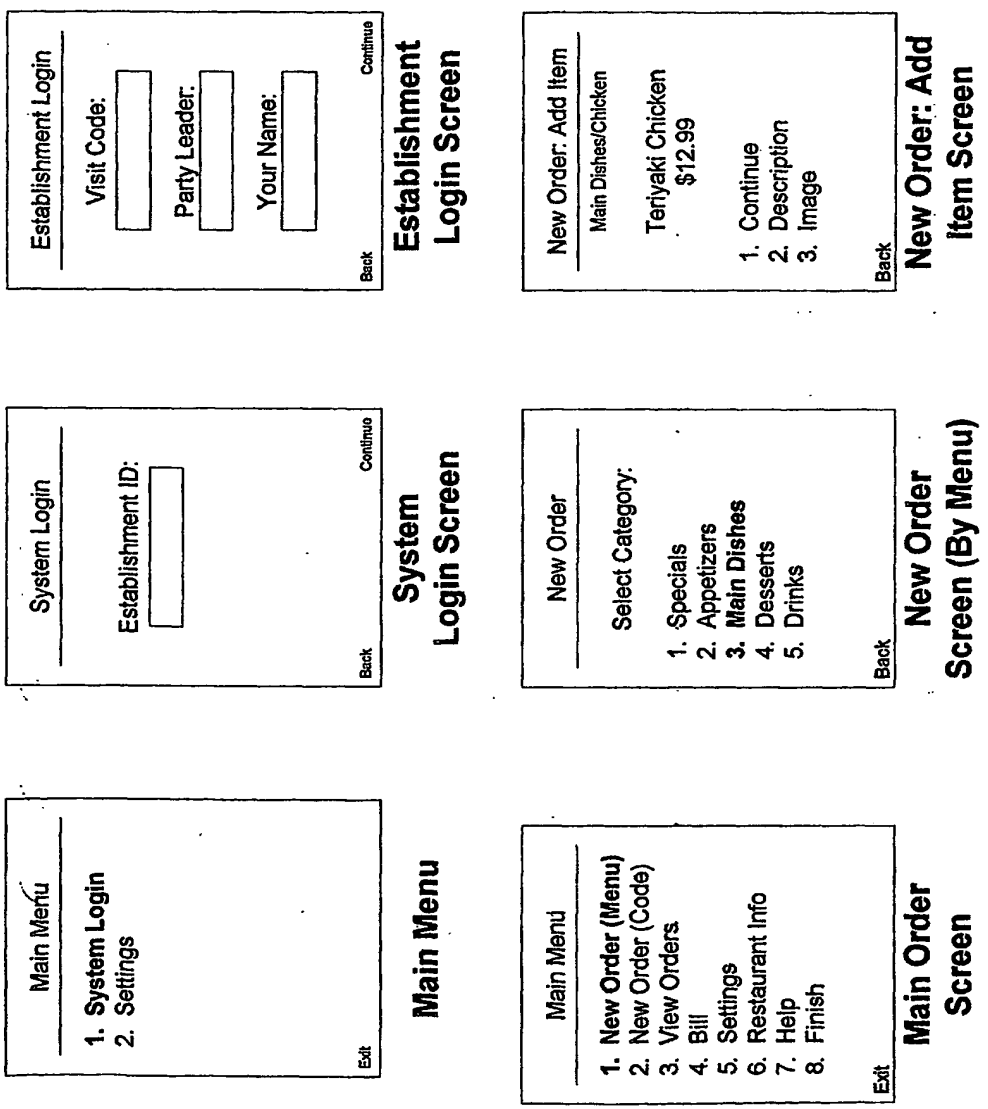
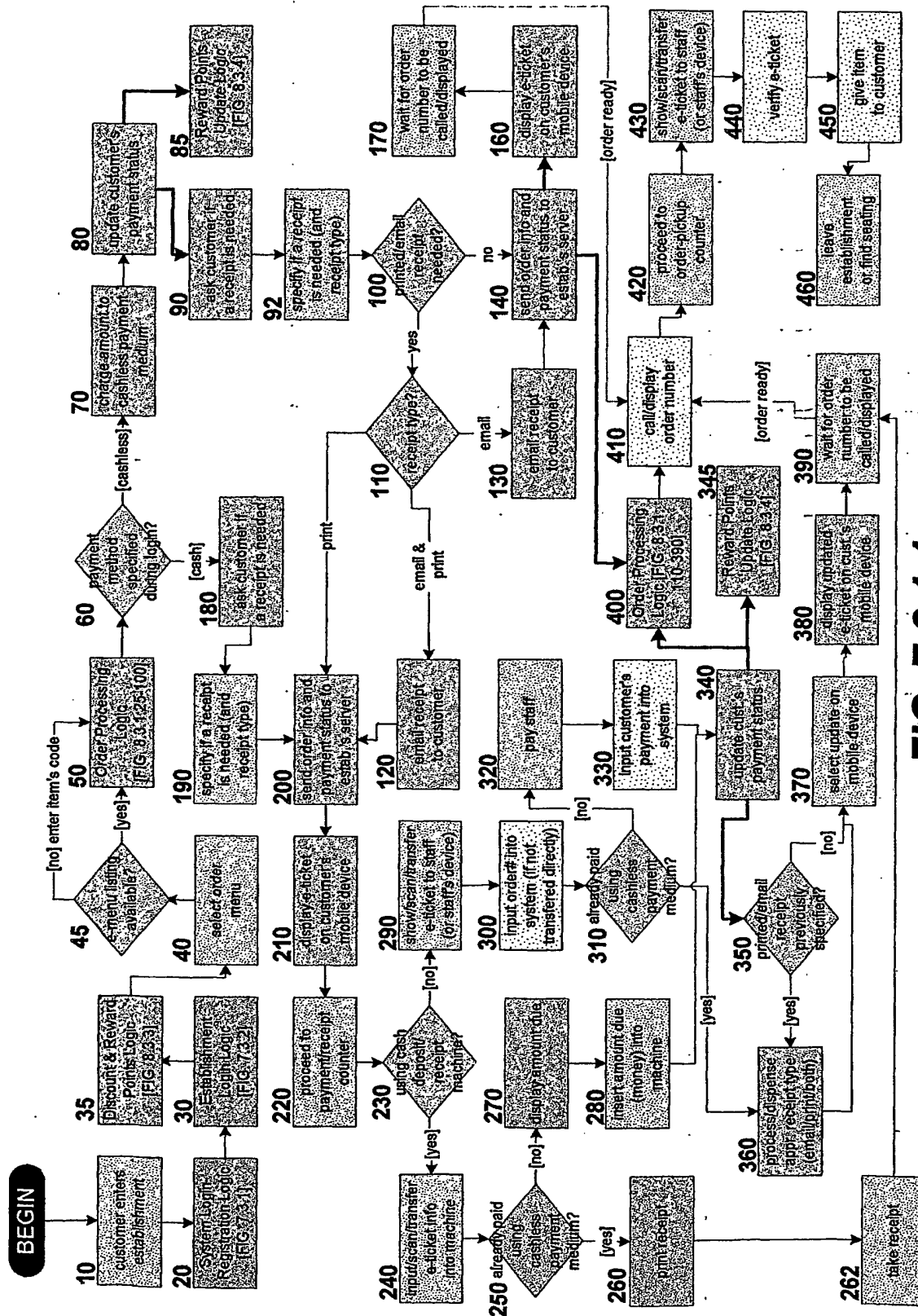


FIG. 7.1.3.1



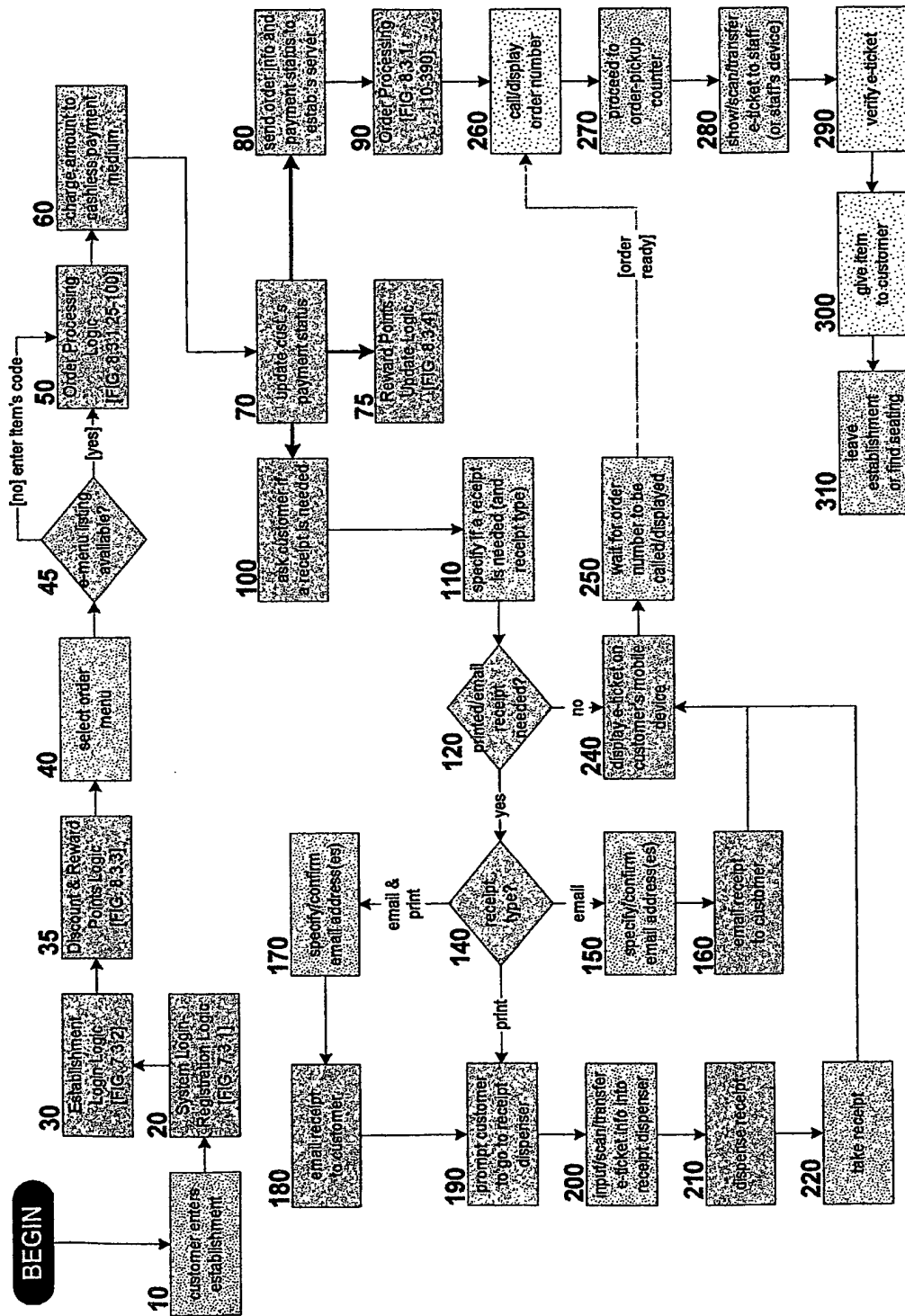


FIG. 7.2.2.1

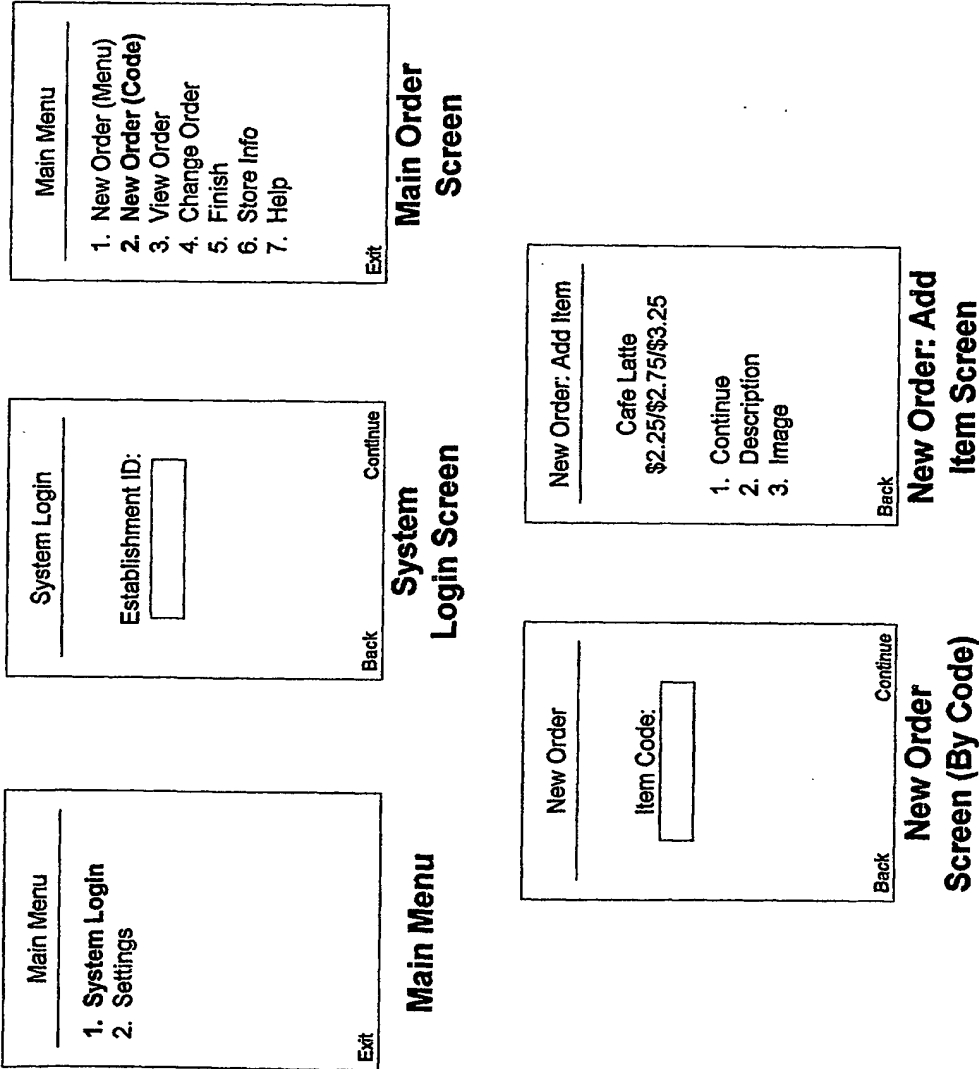


FIG. 7.2.3.1

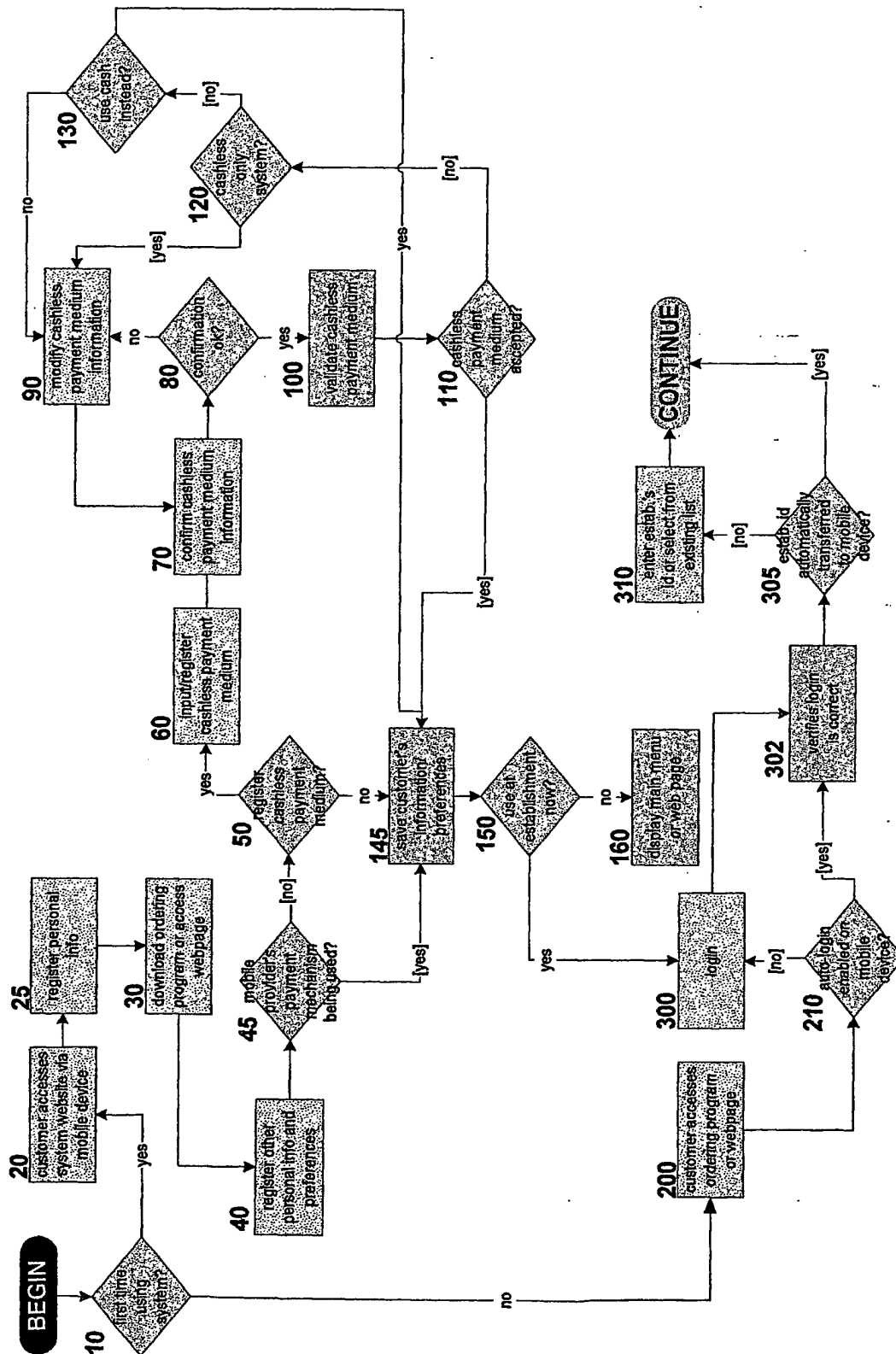


FIG. 7.3.1

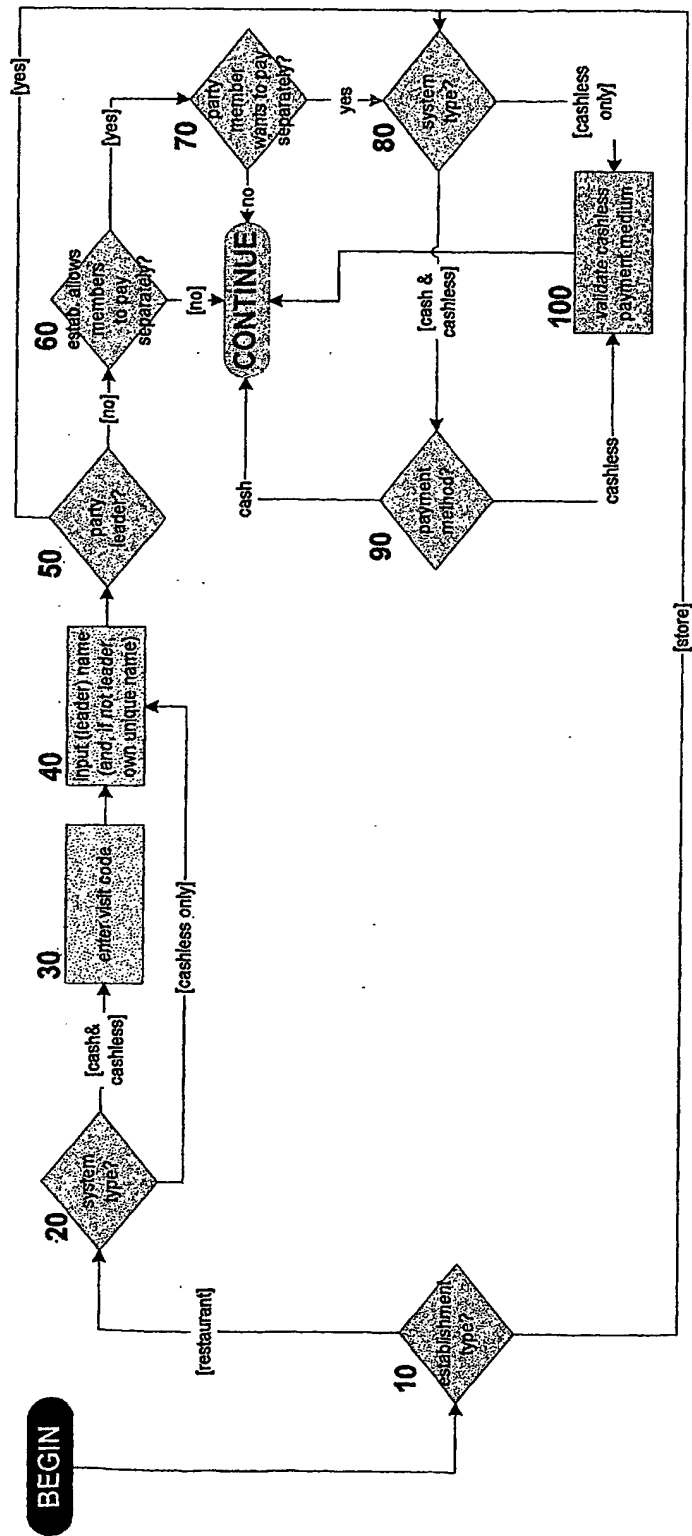


FIG. 7.3.2

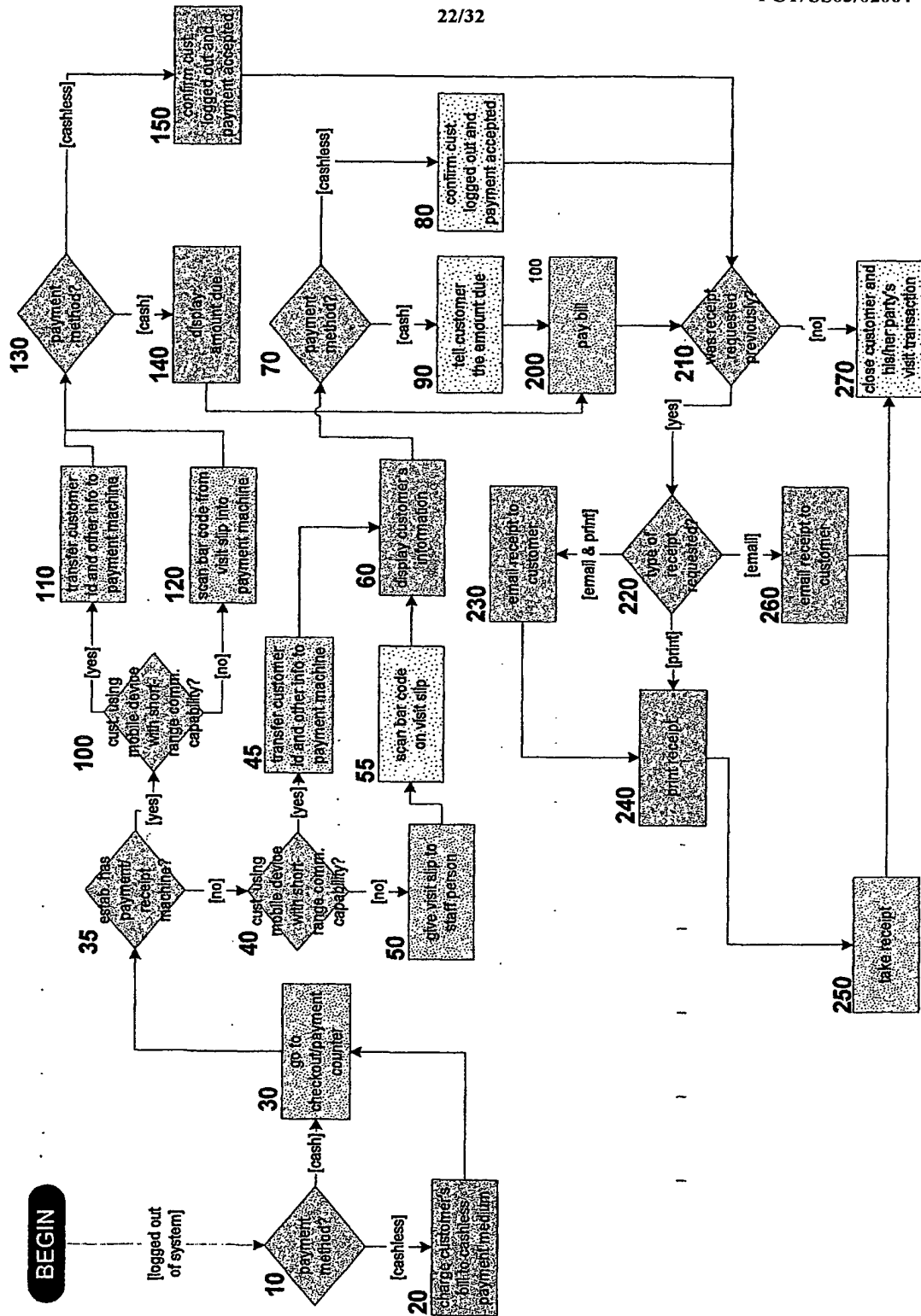


FIG. 8.1.1.1

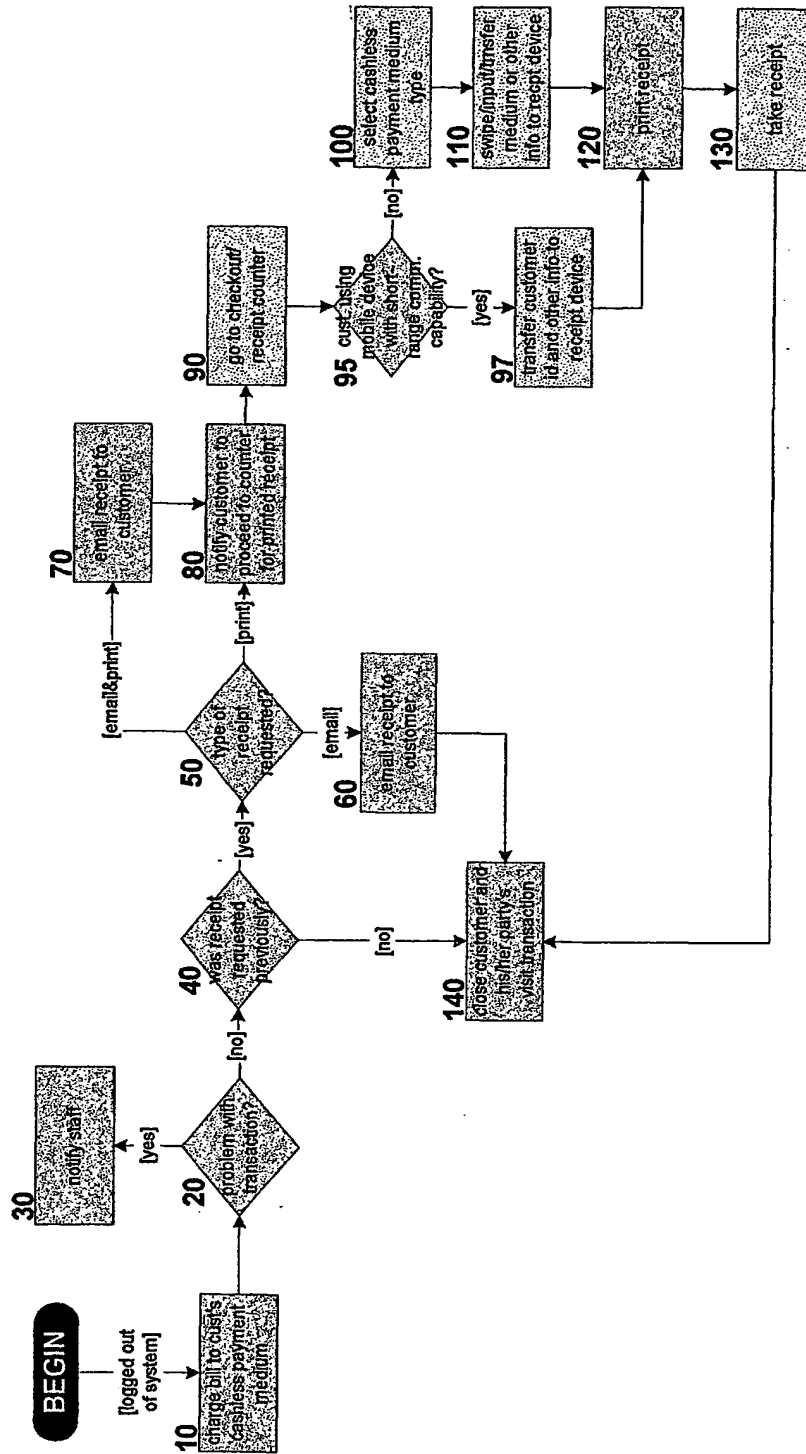


FIG. 8.1.2.1

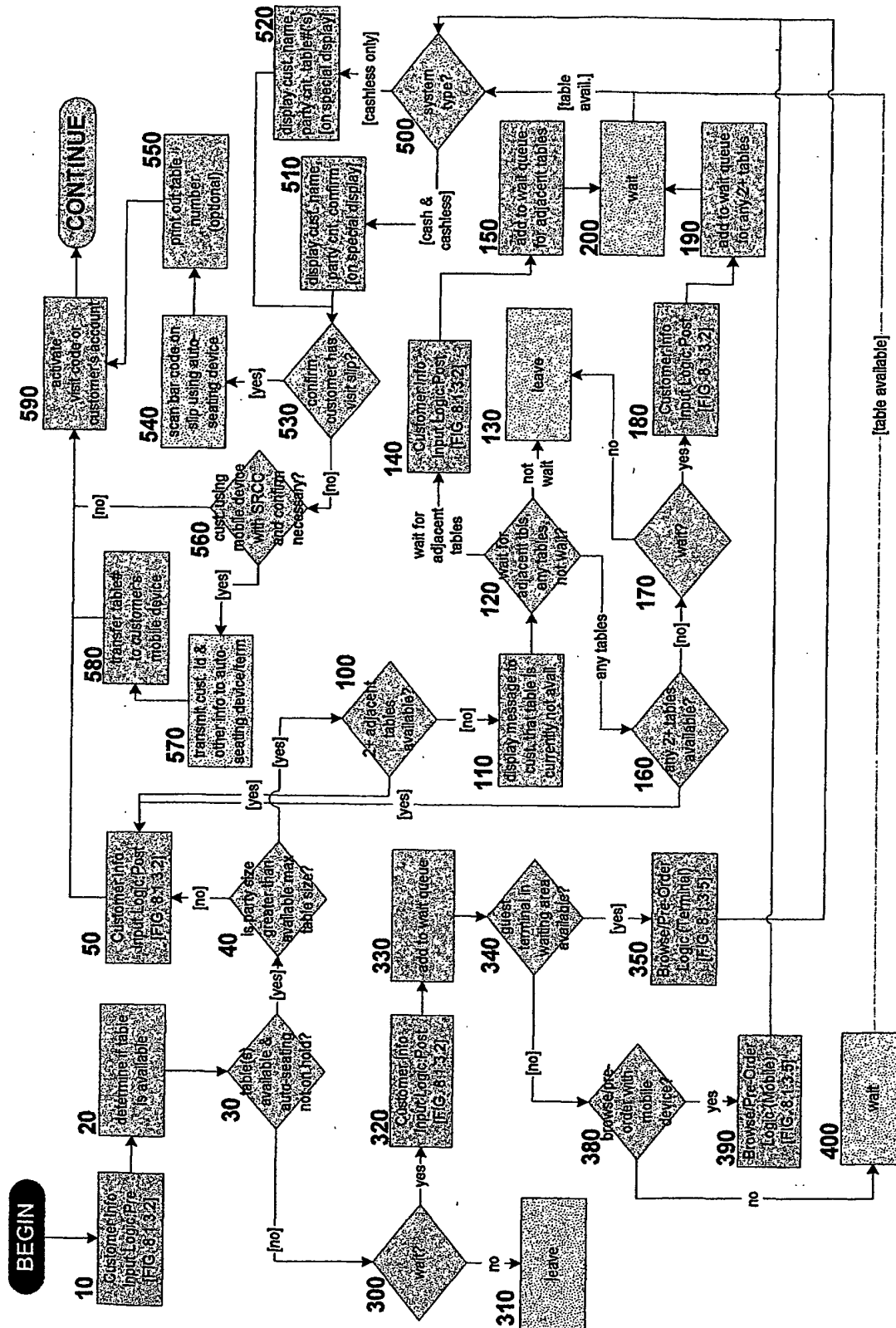


FIG. 8.13.1

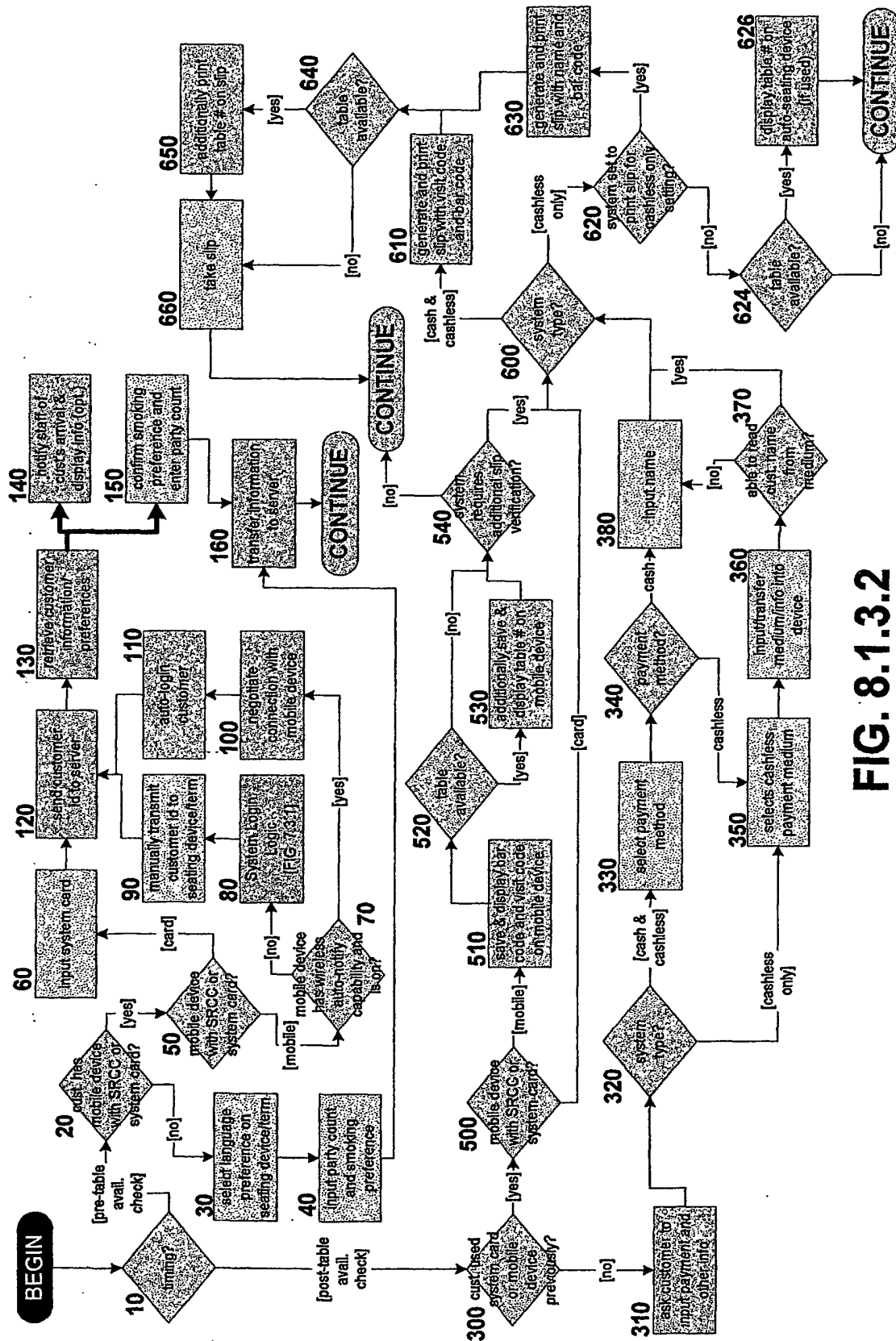


FIG. 8.1.3.2

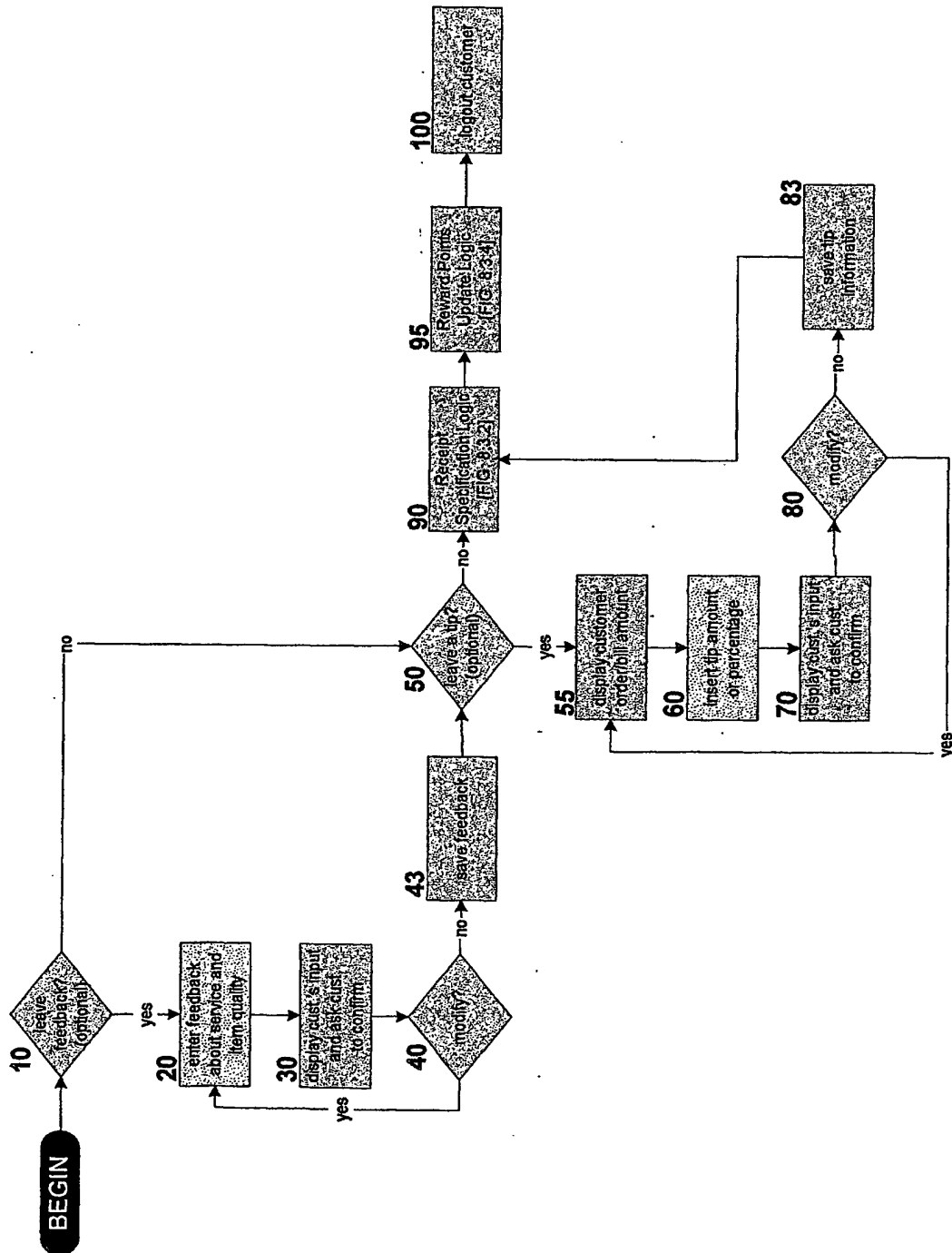


FIG. 8.1.3.4

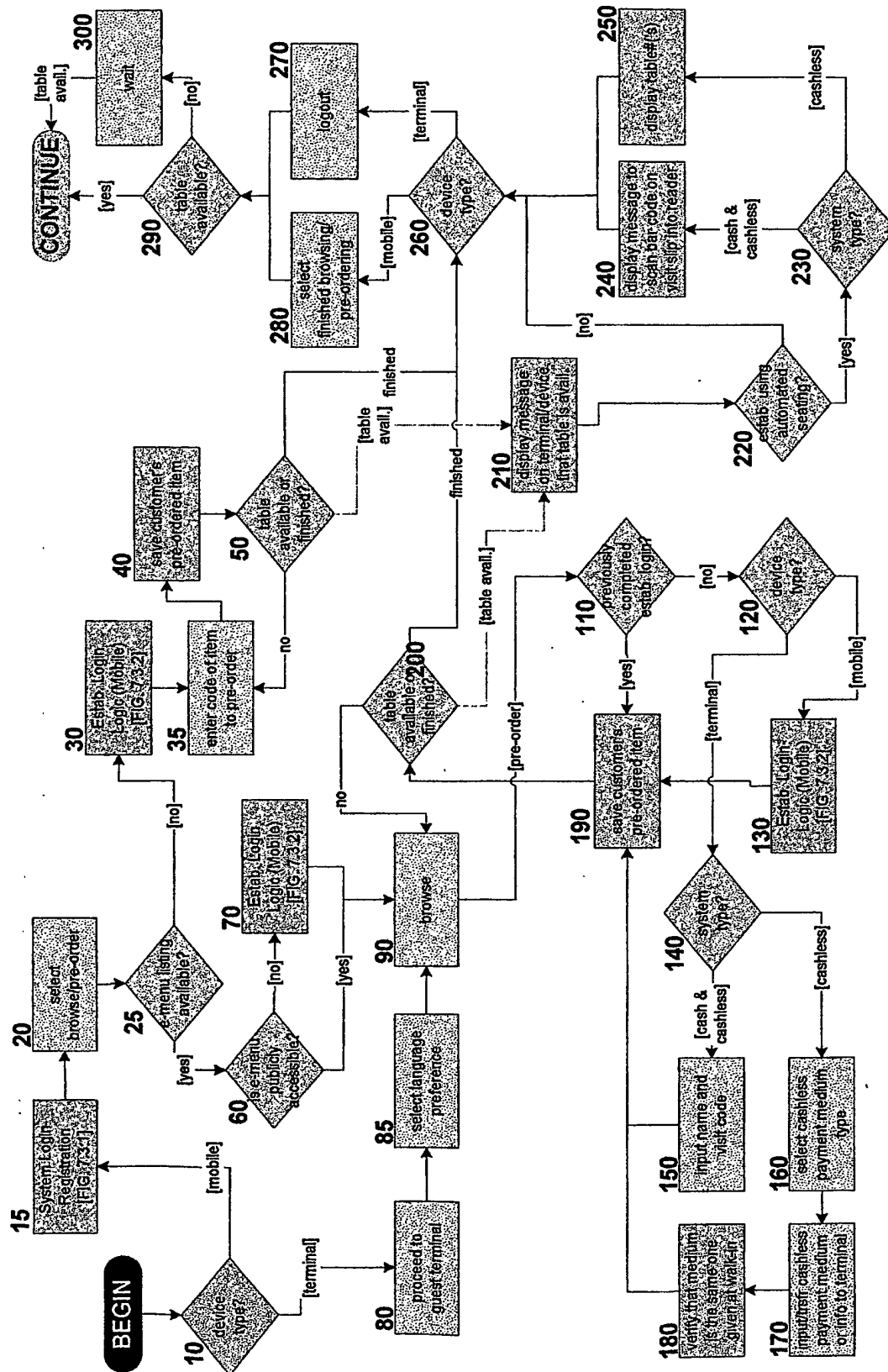


FIG. 8.1.3.5

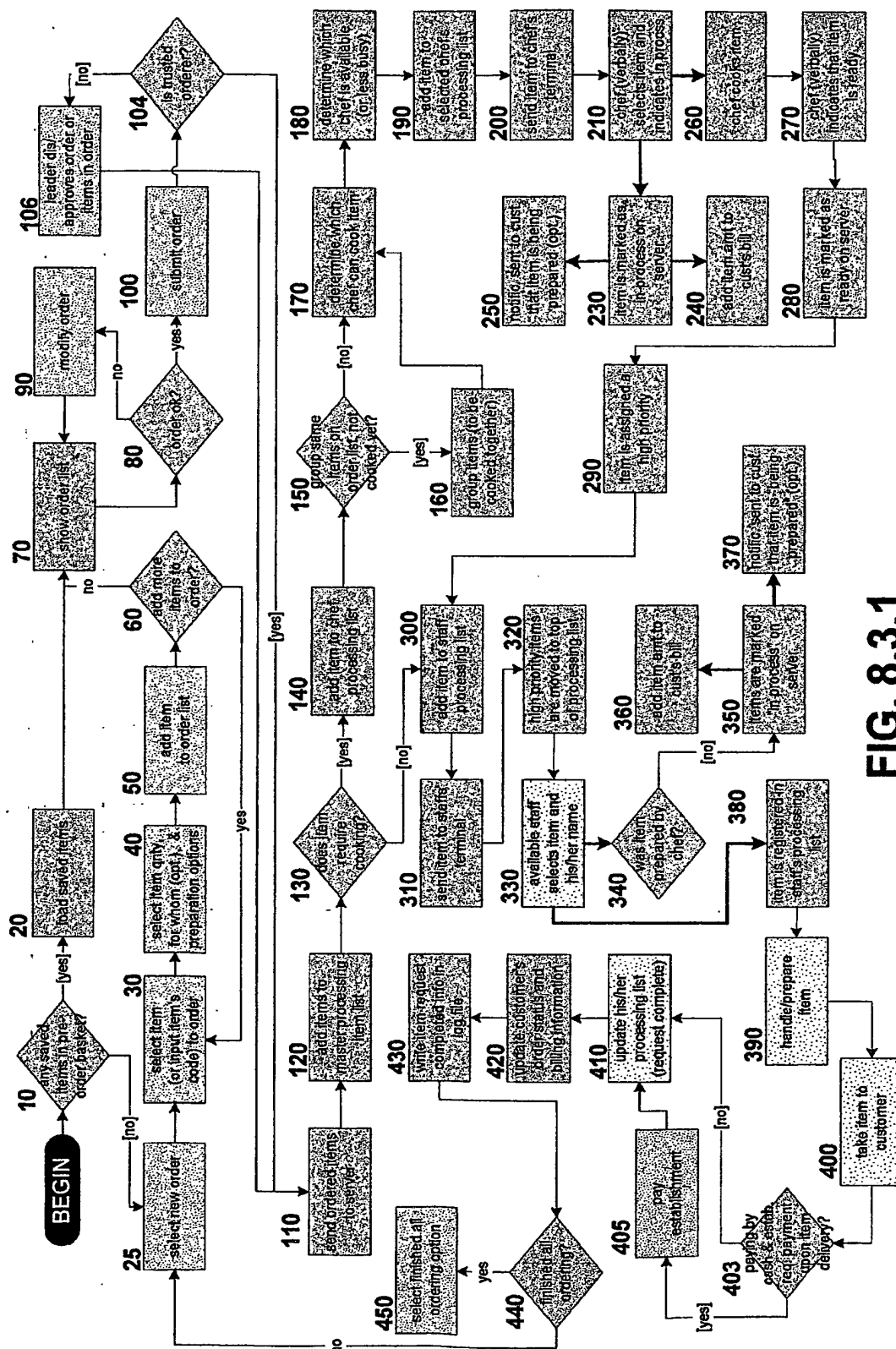


FIG. 8.3.1

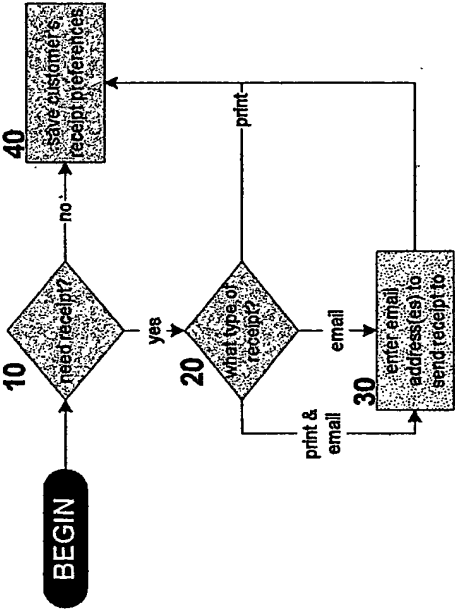


FIG. 8.3.2

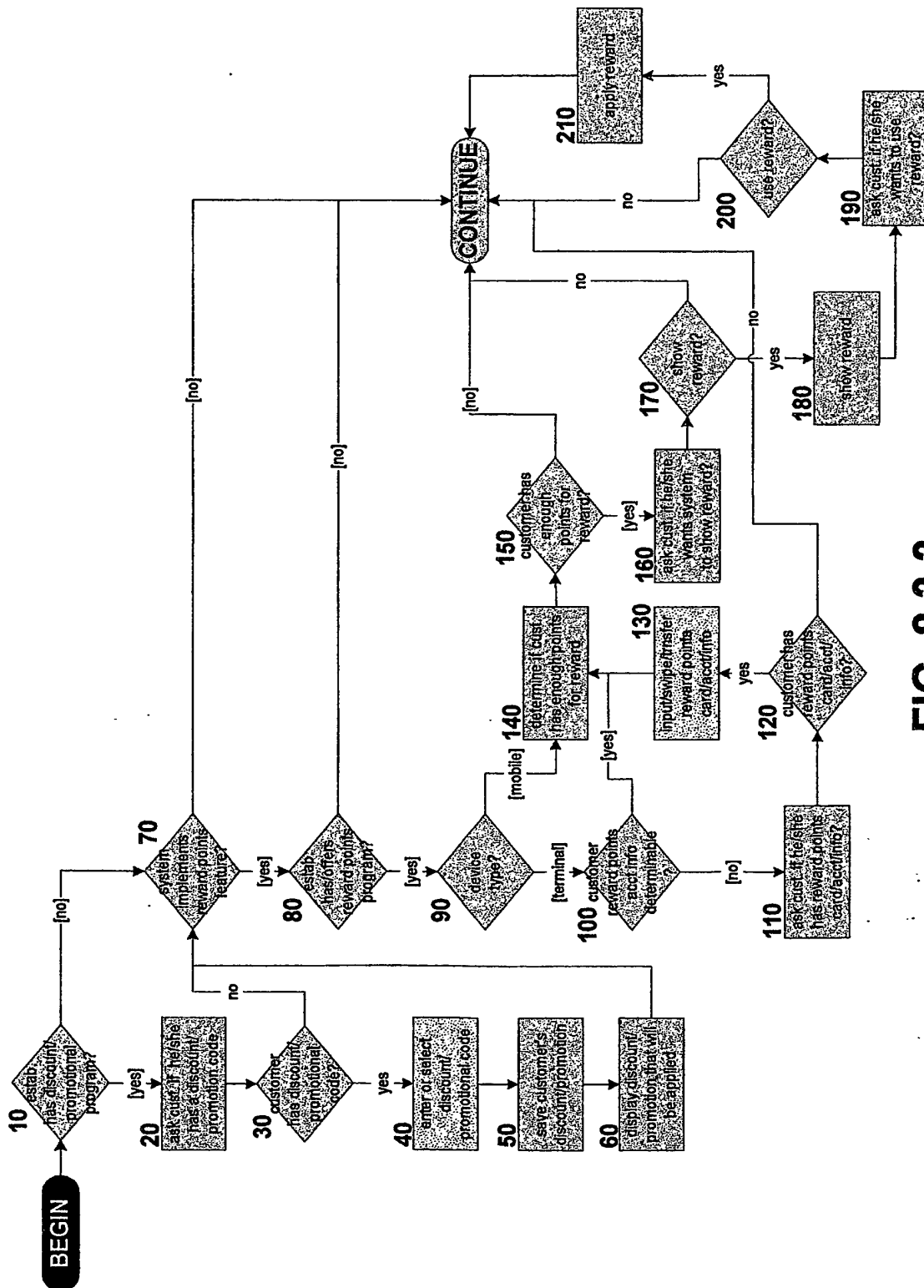
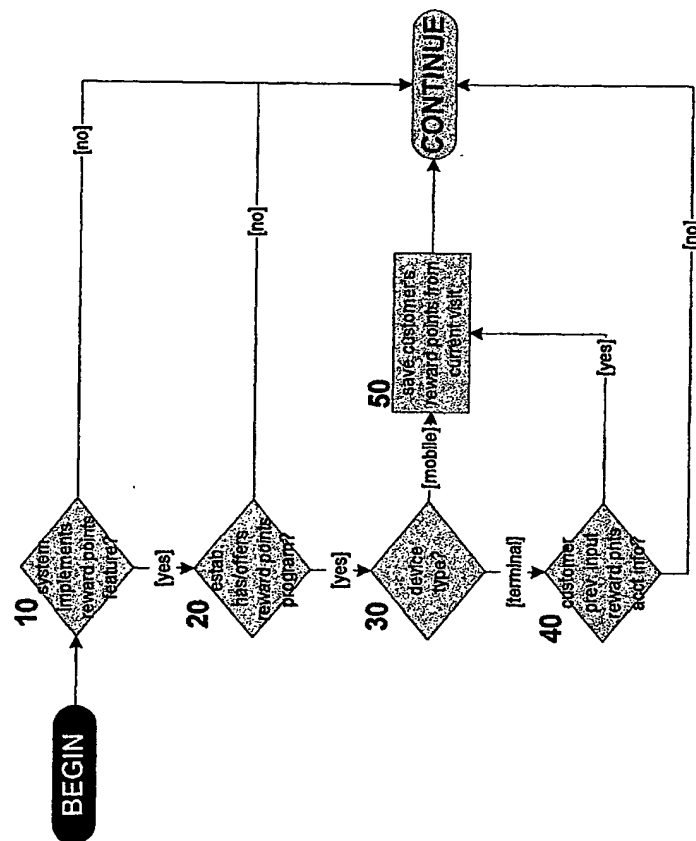


FIG. 8.3.3.3

**FIG. 8.3.4**

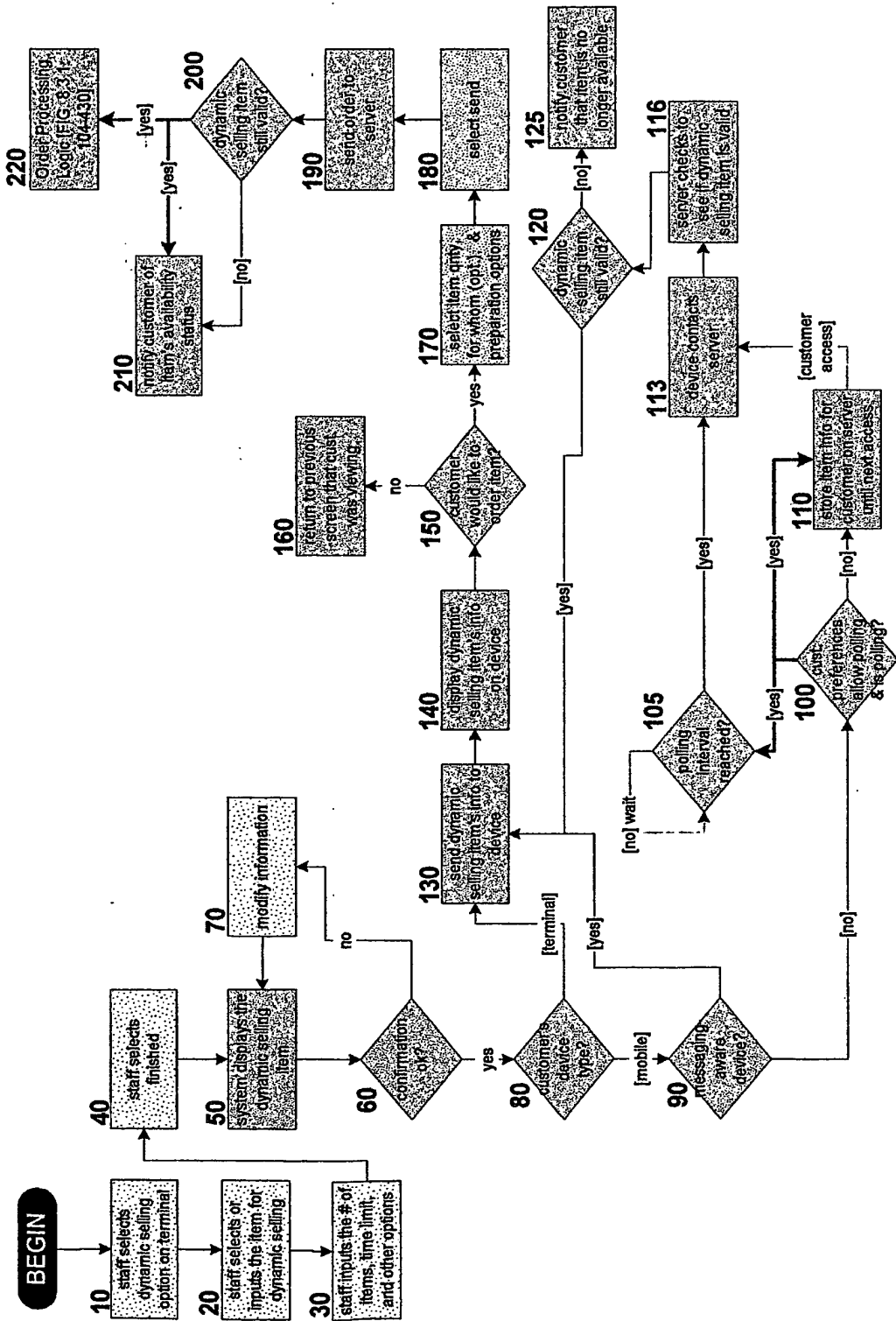


FIG. 8.3.5