PIN Vending system overview

Introduction

This system provides direct retail vending of prepaid cellular airtime. The customer receives a printed voucher containing the information necessary to make use of the airtime purchased (see **Figure 1**).
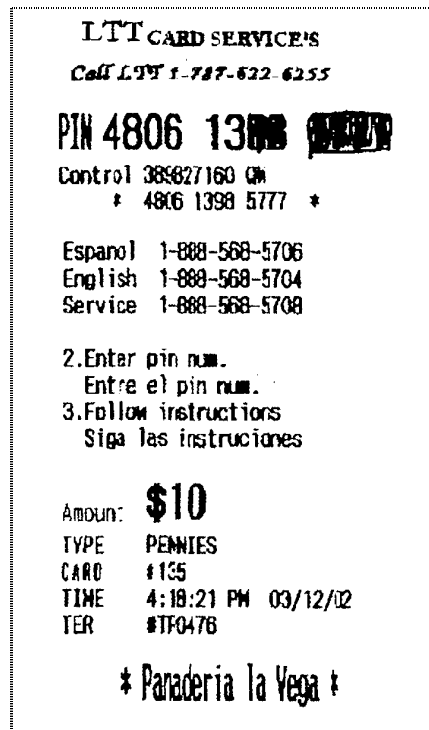

Figure 1 – Sample Voucher

Hardware Environment

The hardware for this system consists of a number of vending machines in retail locations connected by modem to a host server.

The vending machines incorporate the following primary elements:
- Embedded processor with the ability to store enough vouchers for at least one day's sales.
- Receipt style printer for producing printed vouchers.
- A bill acceptor to receive payment for the voucher.
- A display to provide the customer with prompts and instructions.
- A keypad to allow the customer to make product selections and otherwise control the purchase.
- A modem for communicating with the host server.
- A serial port for maintenance functions (software updates, setup options).

The host server system may be comprised of one or more general-purpose computers. It incorporates the following primary elements:

- A mass storage subsystem to house the master database of product, client, and accounting information.
- Removable storage devices (diskette, CDROM) for loading of voucher information from airtime providers.
- A modem bank for accepting communication from client systems.
- One or more operator consoles for system control and data entry.
- One or more printers for accounting and status reports.
- One or more printers for producing proof copies of vouchers.

Data flow

The primary element of data (and the product being sold) in this system is a PIN number. These numbers are purchased from airtime providers. Each PIN number is accompanied by a control number, and optionally by a security code. Each group of PINs are for a specific product. That is, a particular airtime plan from a particular provider at a certain cost per PIN. Depending on the provider, these numbers may arrive in a variety of formats and media. A typical example would be a 3.5" diskette containing a plain text, CSV file.

New PINS are loaded to the database by an input filter designed for their specific format. They are indexed by :

- Product ID. This completely identifies the PIN as to provider, plan, and price.
- Owner. More than one vending machine operator may be serviced by one host system. This identifies the owner of the PIN.

Vouchers are created by the host by merging the PIN information with a template containing the fixed text portion of the voucher. A single PIN may be merged with more than one template to create copies of the voucher in alternate languages. Only the top portion of the voucher (that portion extending through the "Type" line in Figure 1) is created. The lines below this will be added at the vending machine.

The vending machine initiates a communication session with the host periodically (typically once a day). After the host authenticates the credentials sent by the vending machine, the vending machine sends a message containing the control numbers of any vouchers that have been sold, and optionally the control numbers of vouchers to be returned to host inventory.

The host updates its database to reflect the information received, and sends an acknowledgement to the vending machine.

The vending machine signals that it is ready to accept new inventory.

Using its record of vouchers currently in the vending machine, the host sends enough vouchers to bring the machine to its target stock level.

Vending machine details

Vouchers are stored in the vending machine in Queues, with one queue for each Product ID. When a new voucher is received from the host, the vending machine attempts to find an existing queue that matches the Product ID of the voucher received. If a match is not found, a new queue is created. The voucher is then added to the end of the queue.

The customer enters a Product ID on the vending machine keypad to initiate a purchase. The vending machine will then attempt to find a matching queue of vouchers. If a match is not found, the customer is prompted to make another selection. If a matching queue of vouchers is available, a description of the voucher is displayed and the customer is prompted to deposit cash to complete the purchase (the customer can cancel the purchase at this point).

When sufficient cash has been deposited, the vending machine will print the voucher, replacing embedded formatting codes with appropriate codes for the model of printer used. The vending machine will print a sequential sale number, the time, date, terminal ID, and location name at the bottom of the voucher.

After the voucher has been successfully printed, its control number is added to a list of sold vouchers and its entry is removed from the queue.

When the last voucher is removed from any queue, the queue is deleted and the vending machine will initiate a replenishment transaction with the host. Replenishment will also take place at a preset time every day regardless of sales.

Host functions

Pin import
This subsystem loads PIN information from the airtime provider to the database. The transmission media and format will vary by vendor.

Voucher layout
This WYSIWYG editor allows creation of voucher templates that can be merged with PIN information to create printable vouchers. It provides for positioning of merged fields and embedding of generalized text formatting information.
Communication front end
This subsystem is responsible for accepting a connection from the vending machine, and implements the protocol necessary to transfer information between the vending machine and the host.

Transaction processor
This subsystem accepts data received from the communication front end, performs appropriate processing, and returns data to be sent to the vending machine.

<u>Reporting</u>
Examples of reports that can be generated are:
- Inventory
- Sales
- Operational statistics
- Errors and exceptions
- Voucher proofs
- Product lists for display on vending machines

<u>Control and maintenance</u>
This subsystem allows the host operator to control various system parameters, set inventory levels and other parameters for individual vending machines, maintain vendor accounts, and monitor system activity.

General requirements and limits

- Provision for alternate language for all text to printed or displayed at the vending machine. The vending machine will maintain two lists of customer prompts and reporting strings. The host system can provide alternate language versions of vouchers and product descriptions.
- The length of the text in each voucher transmitted by the host can run from less than 300 bytes up to 1K bytes and more. Voucher text in this system is limited to 1535 bytes per voucher (each language).
- The vending machine can store 200K of voucher text.
- The vending machine can store no more than 40 different types of vouchers at once.

Voucher fields

LTT CARD SERVICE'S — Vending Operator

Call LTT 1-787-622-6255

PIN 4806 13▮▮ ▮▮▮▮ — PIN number

Control 369827160 CA — Control Number

    * 4806 1398 5777 * — PIN repeated

Espanol   1-888-568-5706 — Instructions
English   1-888-568-5704
Service   1-888-568-5708

2.Enter pin num.
   Entre el pin num.
3.Follow instructions
   Siga las instruciones — Purchase price

Amount: **$10** — Product name / Sequential sale #

TYPE   PENNIES
CARD   #135 — Timestamp
TIME   4:18:21 PM 03/12/12 — Machine ID
TER   #TF0478

* Panaderia la Vega * — Location Name

From Host

From vending machine