



PreChat

Electronic Voucher Distribution System
Overview of System Architecture

Wednesday, 28 May 2008

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1. Understanding the Business

When Wireless Business Systems in conjunction with its software development company, Backbone Technologies, considered entering the Electronic Voucher Distribution domain, it first undertook a study of the issues impacting the prepaid telephonic market, with, at that time, particular relevance to the GSM market space. From this we concluded:

- Operators in maturing telecoms markets face a significant challenge in maximising revenues from their existing services. The priority in many cases is to increase average revenue per user (ARPU), whilst remaining competitive enough to maintain or increase market share. In this context, the optimization of tariffs is critical to the success of the business.
- Solutions needed to be found that are practical, attractive to customers, and efficient at delivering optimum ARPU levels.
- Obviously as the initial service offering from a GSM network, voice services are of prime importance; and although this starts with “contracted” services it soon needs to address the larger market space – that of “non contracted” prepaid service.
- Numerous network voice clients are migrating from “contractual” services to Prepaid services.

We then researched the physical Prepaid Voucher environment in an effort to understand the business benefits and pit falls of distributing prepaid airtime via the physical scratch card versus electronic distribution; and finally we evaluated the array of systems presently in the market place.

We via our research concluded that:

- Physical “Scratch” Cards
 - There are enormous costs associated with the management and distribution of the physical card and that these costs could easily US\$1million per month for a comparatively small network and be far in excess of this for a large network.
 - The “lead-time” required in managing the ordering, printing and distribution of “physical” cards was generally of the order of two (2) months. This resulted in large capital reserves being tied and unproductive for extended periods.
 - Although the physical Prepaid “Scratch card” Voucher was invariably the first vehicle utilised to gain a foothold in the prepaid market place – it is severely encumbered by logistical constraints which obviously impact on ARPU. There are costs involved in printing, storing, protecting, managing and distributing the physical card which inhibit the introduction of lower denomination tariffs and consequently impact on the potential client base
- Existing Electronic Voucher Distribution Systems
 - Generally targeted the affluent “prepaid” subscriber via such sophisticated Point of Sales devices such as ATM’s and Internet Credit/Debit transaction mechanism. Yet this was the smallest category of prepaid user.
 - By and large existing EVD systems utilised the internet for delivery, but this inhibited them from delivering the prepaid airtime product to remote outlying areas within the network empire, where major growth opportunities exists. In effect, they were restricting distribution to major cities/towns, the area presently well serviced by the “physical” card.



PreChat Electronic Voucher Distribution System

With these insights Backbone Technologies set about developing an Electronic Voucher Distribution System which would substantially address the Network/Distributor business concerns as well as providing an efficient, attractive service to the customer.



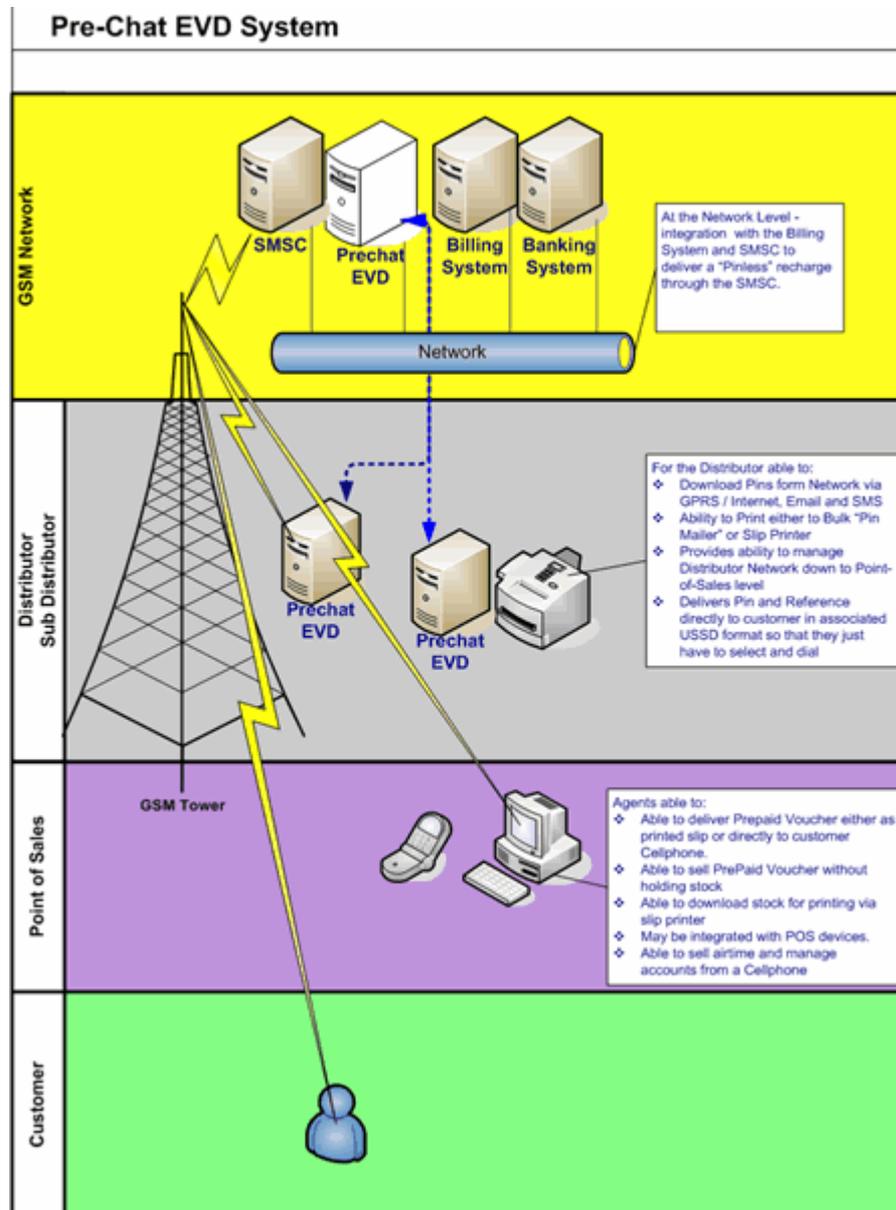
2. The PreChat – Electronic Voucher Distribution Solution

With the PreChat Electronic Voucher Distribution Solution we looked at:

- Considerably enhancing the efficiencies and lowering costs associated with the distribution of Prepaid Vouchers.
- Utilising a number of electronic deliver vehicles (“sms”, GPRS/Internet and email) to deliver prepaid vouchers to both the retailer and the customer via a standard POS gateway/interface.
- Providing attractive status leading features that would enhance the end user experience, through features such as:
 - “Pinless” recharges which integrate with Electronic Billing Systems to provide a seamless prepaid phone account update. E.g. “Thanks for your deposit of \$5.00, your account balance is now \$7.30”
 - Where the system is not connected to the Billing System we are able to deliver prepaid PINS directly to the customers cell phone via “sms” in a format that enables most cell phone users to select the entire dialling instruction inclusive of PIN and submit it directly in USSD (Unstructured Supplementary Service Data) format to the networks.
 - Printed vouchers that can be either printed via the normal receipt printer or “bulk” printed to pin mailers (concealed paper similar to that issued by banks with your account PINS).
- Enabling the Distributor to manage their own distribution network with fund transfers between electronic wallets via a cell-phone.
- Ensuring that we had an integration front that could work with a number of POS devices including the Cell phone.

3. The PreChat Architecture

3.1. PreChat System Architecture Overview



PreChat addresses Electronic Voucher Distribution at three levels:

- The Network/Super Dealer,

PreChat has been built to accommodate the needs of the Networks and Super Dealers. It is possible to integrate the system with Billing Systems, SMSC ports and Banking systems to deliver a seamless "pinless recharge" service.

PreChat Electronic Voucher Distribution System

- The Distributor and

PreChat endeavours to deliver Electronic Vouchers via GPRS/Internet, eMail and SMS to the point-of-sale.

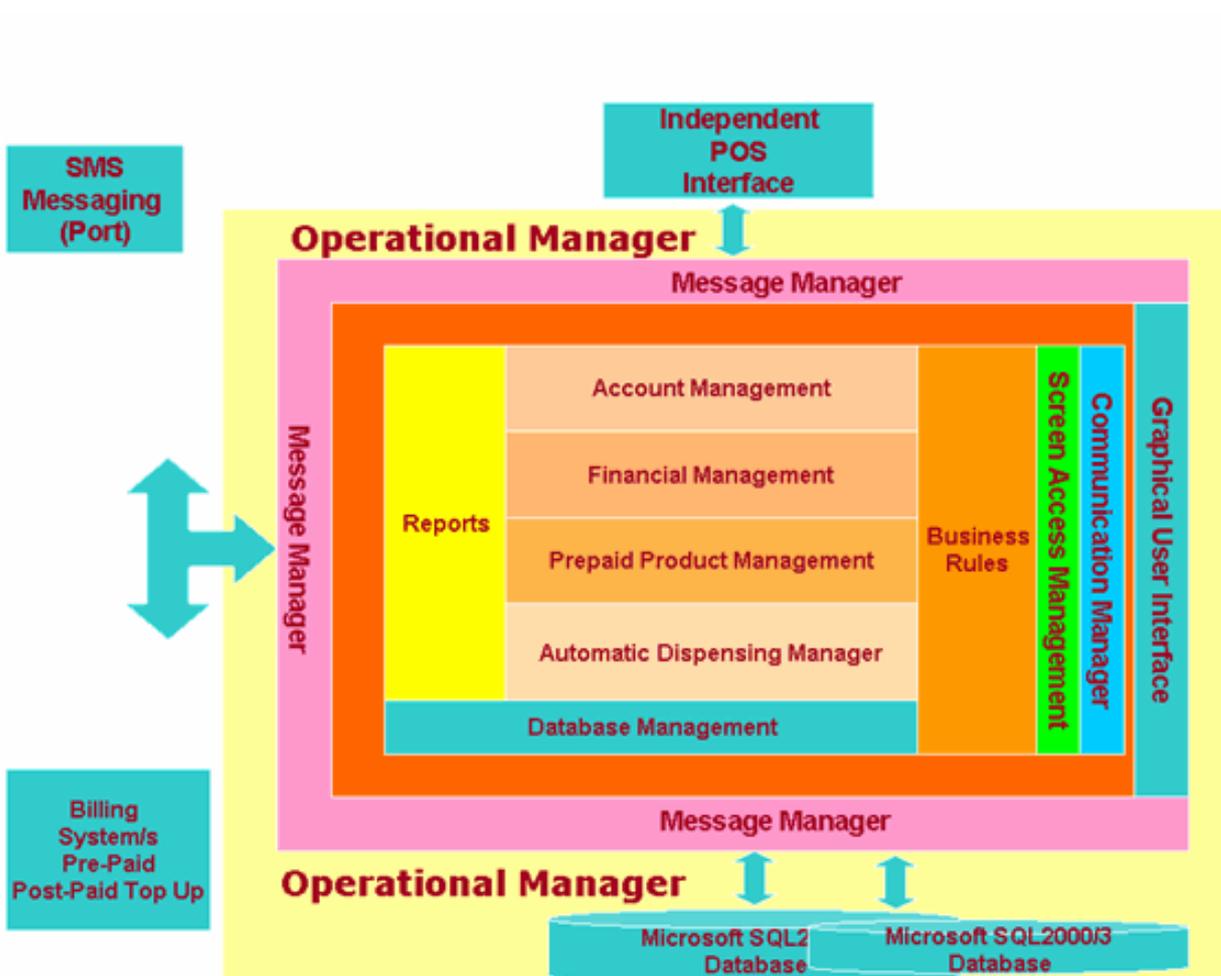
It then allows these to be distributed via a variety of mechanism either directly to the customers phone or via one of two print mediums – the till slip printer **or** a concealed “pin mailer” which is the perfect substitute for the physical “Scratch Card”.

The Distributor and agents under their umbrella also have the ability to manage fund allocations through transfers between “electronic wallets” via a Cellphone. This is a PIN secured transaction and transfers fund transfers can take place within the same Distribution Tree structure.

- The Agent/Point-of-Sale.

In the development of PreChat we looked at integration with a number of POS devices, including the robust and widely used cell-phone, to ensure that we could deliver Voucher Pin’s across multiple mediums and via a multitude of devices.

3.2. Detailed PreChat Architecture





PreChat Electronic Voucher Distribution System

3.2.1. Graphical User Interface

This is provided via JAVA enabled frames and panels.

3.2.2. Message Manager (Bot)

The Message Manager decipheres and enciphers two way communications between the various applications and devices that communicate with the PreChat EVD system then assigns these to processing threads to ensure smooth, fast and efficient processing.

The message manager decipheres messages as follows:

- Assign incoming messages to the different functions.
 - Assigns Pre-paid/Post-paid/Pinless Orders, queries, top-ups and resends to the Ordering Manager
 - Assigns Wallet transfers to the respective accounts
 - Assigns Cell phone Transfers to the transfer module which communicates this information with the Billing System/s
 - Assigning other incoming messages to the Help Desk
- Assigns Outgoing Messages to the SMS Messaging Server
 - Distributes outgoing messages by network operator if required
 - Distributes message loads via available SMS Messaging Server Ports.

3.2.3. Security Manager

This component allows for the allocation of an authorised person to administer the functional privileges assigned to the different users. When the system is initially setup it allows for a default administrator who can then assign the different users to the system and allocate them operational rights.

- Create/Modify Administrator authorized users.
- Configure User Privileges
 - Enable/Disable access to certain functionality/features.
 - Enable/Disable screen views
- Create/Change Access Password

3.2.4. Communications Management

The Communications Manager allows for communication between individual and group/s of Cell phones via the formation of "a group". One can send a message from a remote point into the system with a group prefix followed by the message and the system will automatically distribute the message to all people with the group.

- Dealer Network Communication – individual and all
- Group Communication – Client and Employee
- Message advises to customer/user base
- Remote message relaying



PreChat Electronic Voucher Distribution System

- Verifiable Communication Trail

3.2.5. Screen Access Management

Manages the screens that a user has access to thus ensuring a division of responsibilities.

3.2.6. Account Management

The Account Management functionality is performed by an authorised staff operator and has the following functionality:

Allows an account hierarchy of 5 levels. The following activities are managed:

- Account Opening
 - Distributor's Primary Account and Hierarchy Accounts
 - Register SIM Cards (Cell Phone Numbers) for Distributors
- Account Closing / Suspension / Re-activation
 - Primary Accounts and Hierarchy Accounts
 - Corresponding Sales Person/s Accounts
 - Corresponding Retailer/s Accounts
- Account Transfers allows restructuring of the Account Hierarchy
 - Allows Transfer of accounts within a hierarchy tree
 - Sales Personnel Account to Retailer
- Queries of any transactional nature against an account.

3.2.7. Prepaid Product Management

The Central Server is the custodian of prepaid PIN's and References that the network issues to the purchaser of prepaid airtime. This facility allows for the following functionality:

- Import prepaid PINS information from Management System.
 - Import via Email/GPRS/Internet/SMS Connect.
- Import Configuration Manager.

3.2.8. Financial Management

The Financial Manager is equipped with a number of mechanisms via which to facilitate the transfer of funds to fund accounts – “electronic wallets” held in PreChat, as well as transfers between Billing System Accounts. Besides the extraction and importing of payment information from a Financial Institutions Internet site, via email, or any other electronic transfer means the system allows for fund transfers between members of a Distribution Network via Cell Phone driven transaction sets. It also provides a manual interface for takings in cash. It has a full management interface and automatically matches a

- Import Payments
- Receives transfers between electronic wallets
- Allows for the Creation/Validation/Invalidation of a Payment



PreChat Electronic Voucher Distribution System

- Provides a Help Desk Payment Management interface
- Automatic Payment inform to Account Payees via SMS

3.2.9. Business Rules

The Business Rules component allows an authorised user to perform the following functions.

It is here that the Operator will set up the different prepaid voucher denominations, their cost and sales pricing, instructions for activation etc.

- Create/Update/Delete Product Codes for Distribution
- Create/Update/Delete pricing structures
- Create/Update/Delete activation messages
- Setup Tax details and
- Setup Discount structures (Special/Individual and Generic)

3.2.10. Reports

The reporting facility allows for the creation of reports. Information is extracted from the database and passed onto Microsoft Access which is used as the Report Writer. A complete suite of management reports accompanies the system. However, it is possible to produce specific reports tailored to an environments requirement.

3.2.11. Security Manager

The Security module verifies "sms" messages received from Sales Personnel and Retailers. The module validates the key words, verifies the message originators mobile number and checks account balances before processing the transaction.

3.2.12. Airtime Scheduler

PreChat has an airtime scheduler that was specifically designed for the corporate environment, whereby a corporate may submit it's employee airtime requirements and these will be automatically dispatched at the allotted frequency, i.e. once a week, twice a month

The corporate submits the employee cell number with the allocated prepaid airtime denomination and the interval at which they require updating.

It delivers the PIN directly to a employees cell phone. Many business these days are moving to prepaid phones for the staff, in this way they can control staff phone costs. However the airtime still needs to be given to each staff member.

3.2.13. SMS Messaging Server (Ports)

The Messaging Server acts as a gateway for "sms" messages received from the SMSC through a predefined SMS number/s. It also manages the outward flow of messages. It is possible to connect a multiple of GPRS/SMS modems to the system. The messaging server can also interact directly with the SMSC for the sending and receiving of messages.

A new messaging server is in development that will manage multi-ports in order to assign incoming/outgoing messages based on either transaction type, product type, communication number, SMSC application/s etc.



PreChat Electronic Voucher Distribution System

3.2.14. Billing System Interface Manager

(Networks Only as Requested)

The Billing System Interface Module communicates with the Network Administrative System to extract and update Account Balances. PreChat is able to integrate with Pre-Paid and Post Paid Billings systems and may integrate with more than one Billing Application. This is accomplished via a pre-defined gateway.

The Billing system Manager caters for the following transactions:

- Updates the Billing system with prepaid payments received and then returns the updated account balance information to the cell phone user.
- Advises the Billing system of transfers that need to take place between cell phone accounts.
- Receives back confirmation that these transfers have taken place and advises the respective cell phone users of their current (cell phone) account status
- Advises Cell phone users when it is not able to update Billing System and, where the transaction type allows, roles back the transfer.

Essentially the transaction flow between the Billing System Manager and the Billing System may be described as follows:

“What is does is pass a customers prepaid account details (Cell phone), number and deposited fund level, to the financial management system in order that this may be updated. It then receives in return the new balance for that user and notifies them that they are now credited with the “deposited” amount plus their account residue.”

The system gives the perception of a fully virtual system although it is based on a fixed Prepaid denomination.

3.2.15. Independent POS Gateway

The Independent POS gateway provides interface strings that are able to negotiate with a variety of POS devices such as ATM's, Cash Tills and handheld devices. (See Specification) for this gateway. These can be further developed as required to interface with a variety of devices.

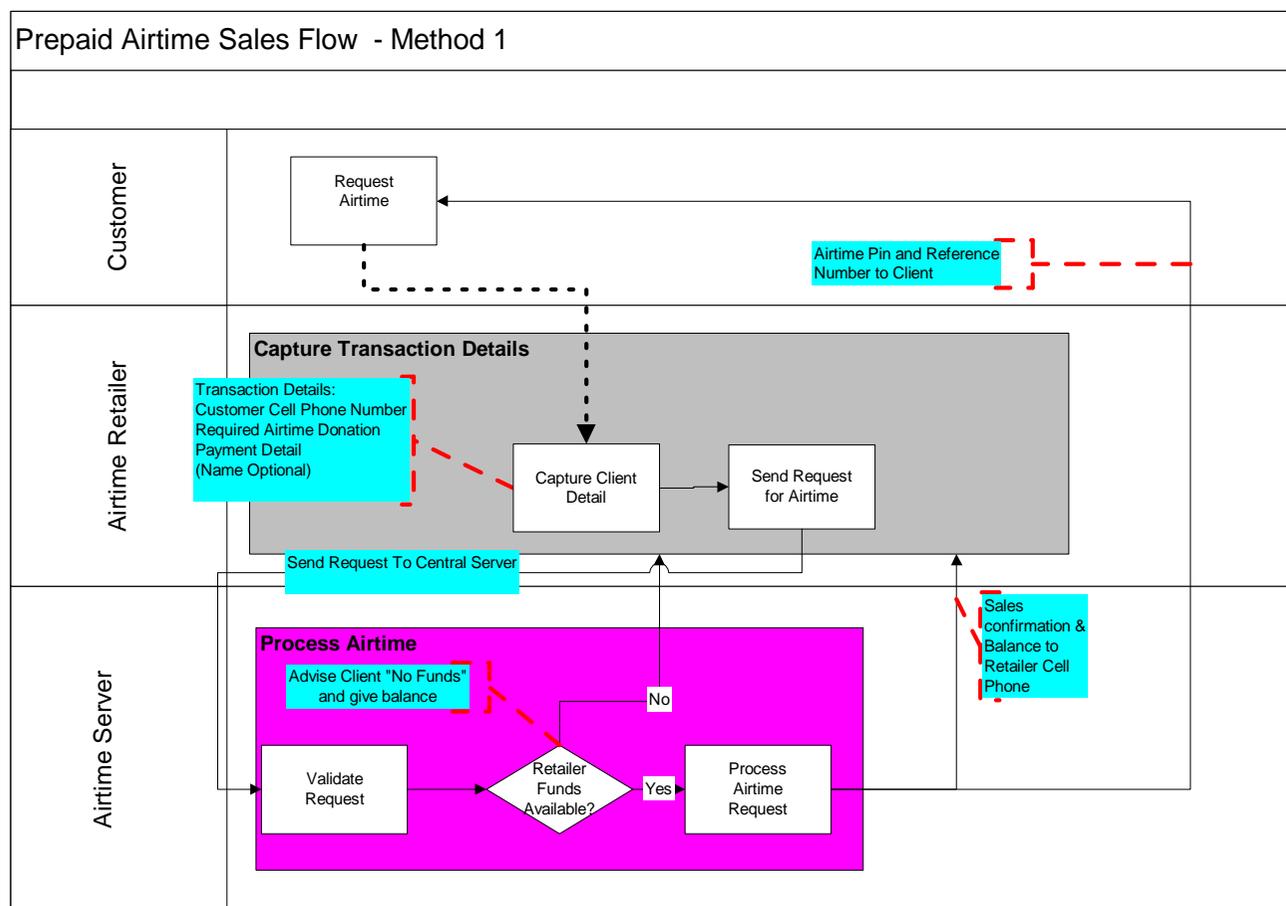


PreChat Electronic Voucher Distribution System

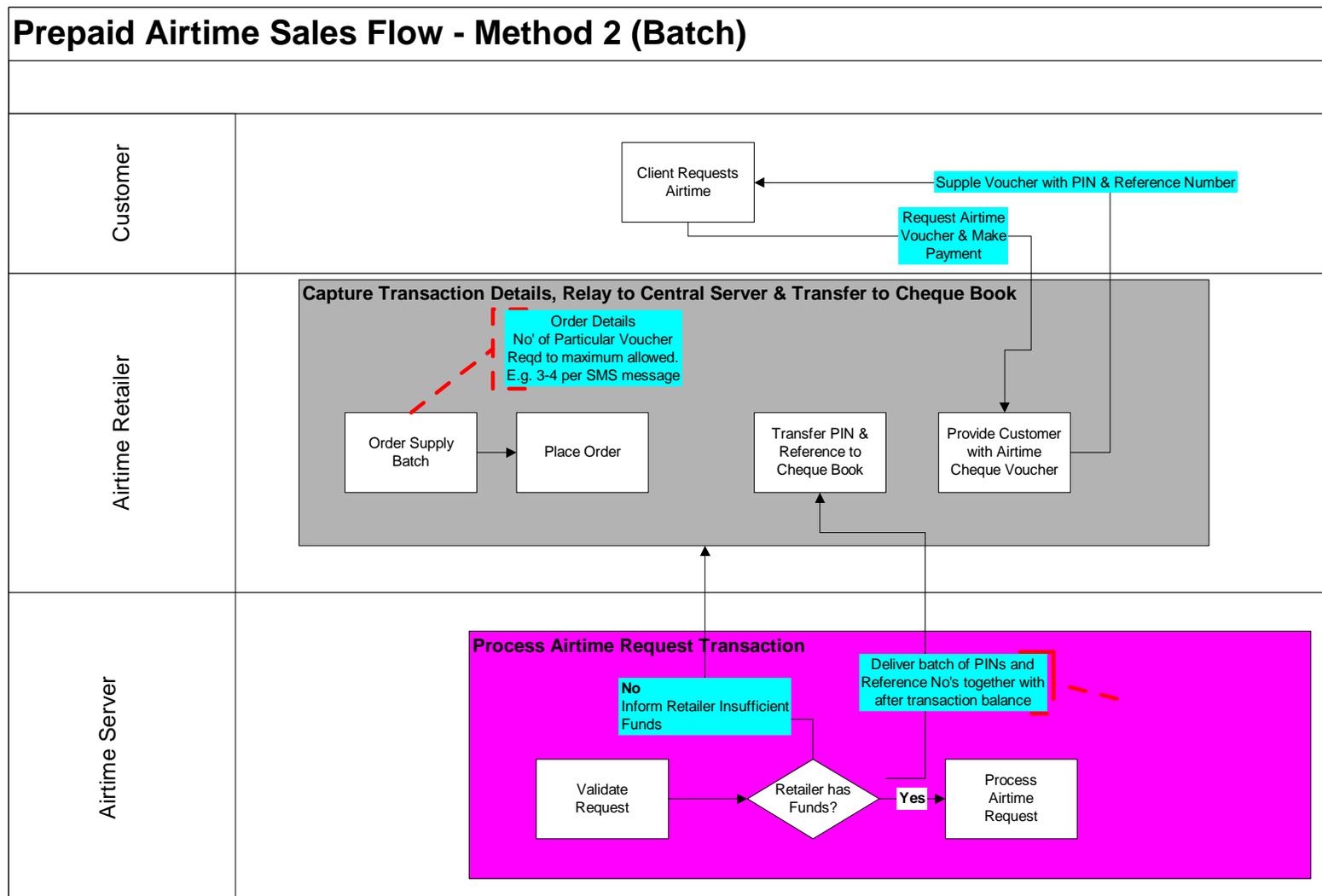
3.3. PreChat Workflows

Below are a few of the workflows that are supported by PreChat.

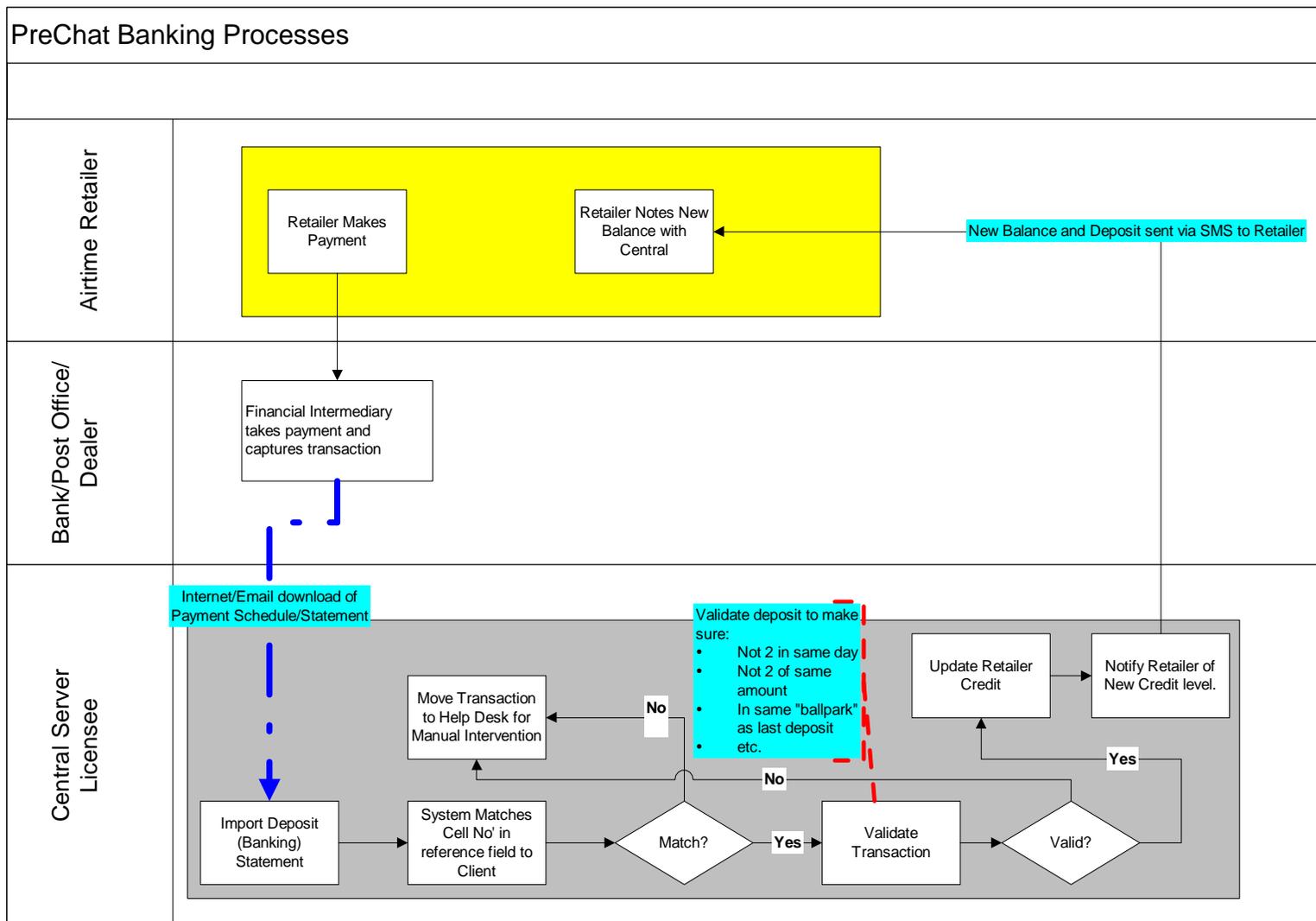
3.3.1. Selling Prepaid Airtime directly to Client via Retailer Cellphone



3.3.2. Downloading a batch of airtime vouchers via “SMS” to a Retailer cell phone for selling



3.3.3. Banking Routine Workflow



3.4. Examples of Instruction Set via Cell Phone

3.4.1. The instruction set for a transfer between “electronic wallets”

Making an “Airtime Wallet” Transfer – Step 1

When a dealer wants to sell airtime electronic airtime to a sub dealer rather than a customer they do this through the airtime wallet transfer.



To do an airtime wallet transfer the customer must input the following:

- The dealers Pin No. who is doing the transfer
- Space
- The text TRANSFER (or allocated Code)
- Space
- The phone number of the sub dealer you are transferring too
- Space
- The amount that you are transferring

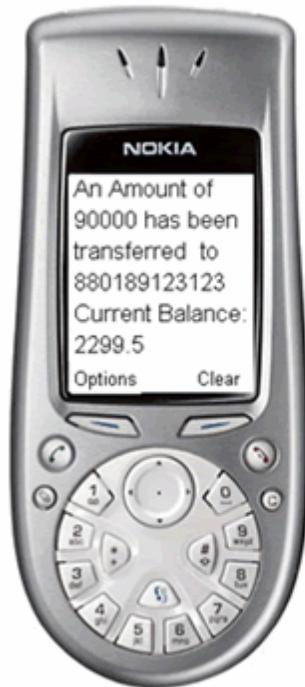
E.g.1234 TRANSFER 0189210654 90000

This would be the first step to transferring TK90000 from you dealers account to the sub dealers account.

In this example the transfer amount of Tk90000 would relate to 200 Tk300 and 50 Tk600 electronic vouchers.

3.4.2. Transfer Acceptance after transferring between “electronic wallets”

Receiving confirmation of the transfer



Once the airtime wallet transfer has been successfully completed both the Dealer and the Sub Dealer will receive a confirmation. If is at this point that the cash payment for the airtime transfer should occur.

The confirmation message includes the following:

- Transferred Amount
- Transfer To Cell number
- The new balance of the Dealer who did the transfer

As an example if the sub dealer is receiving a 2% commission from the dealer then the sub dealer will pay Tk88200 to the dealer.

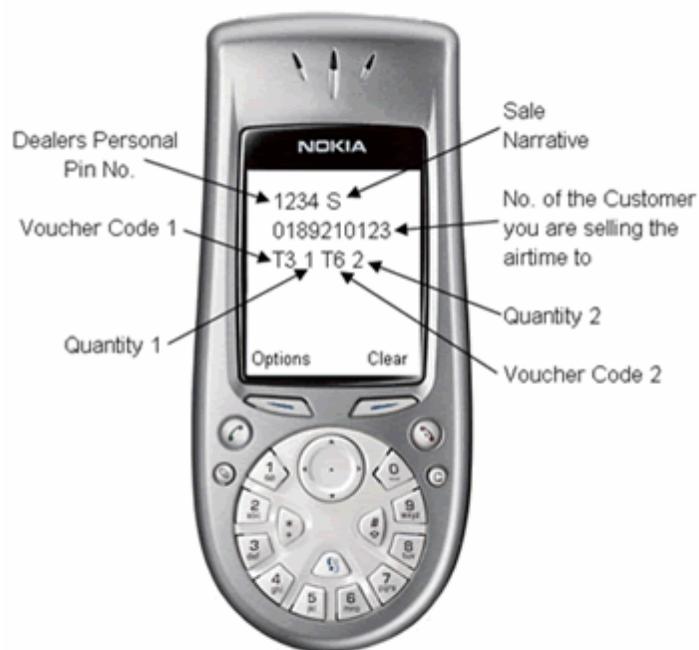
The transfer amount of Tk90000 is the total voucher amount and the cash payment is less the commission that the Sub Dealer is receiving.

The commission discounts are handled between the dealer and sub dealer and can differ on a case by case basis.

3.4.3. Selling a Voucher via Cell Phone

Multi Voucher Type - Sale Input Text

To make a multiple voucher type sale all text will be the same as the single voucher type input, except the additional voucher order is added to the end of the message.



After the single voucher type input the following will be added:

- Space
- The second voucher code
- Space
- The quantity of the second voucher the customer wishes to purchase

E.g.1234 S 0189210123 T3 1 T6 2

This would send one TK300 voucher and two TK600 vouchers to the customer and reduce the dealers airtime wallet by TK1500.

3.5. The Concealed “Pin Mailer”

This serves as an excellent alternative for the physical “scratch card” without the associated logistics and cost constraints. Voucher information may be transferred electronically in an encrypted format to the Point-of-Sale and printed there. The Print is pre-printed with the desired artwork and may carry advertising material.





4. Technical Requirements

4.1. Software Requirements

PreChat has been developed to run in the Microsoft environment. It operates best in the Windows 2000 environment and requires Microsoft SQL 2000 server or later as the database environment.

The database configuration required ultimately depends on the volume of transactions to be managed. Microsoft SQL 2005 Enterprise Edition coupled with MOM (Microsoft Operational Manager) accommodates distributed process across clustered databases and provides features such as Fail Safe Management, Database Management etc.)

Recommended:

Operating System:

Windows 2000 / 2003 Server and XP

Database:

Networks: Microsoft SQL 2005 Enterprise Edition coupled with Microsoft Operation Manager and Microsoft Active Directory

Network:

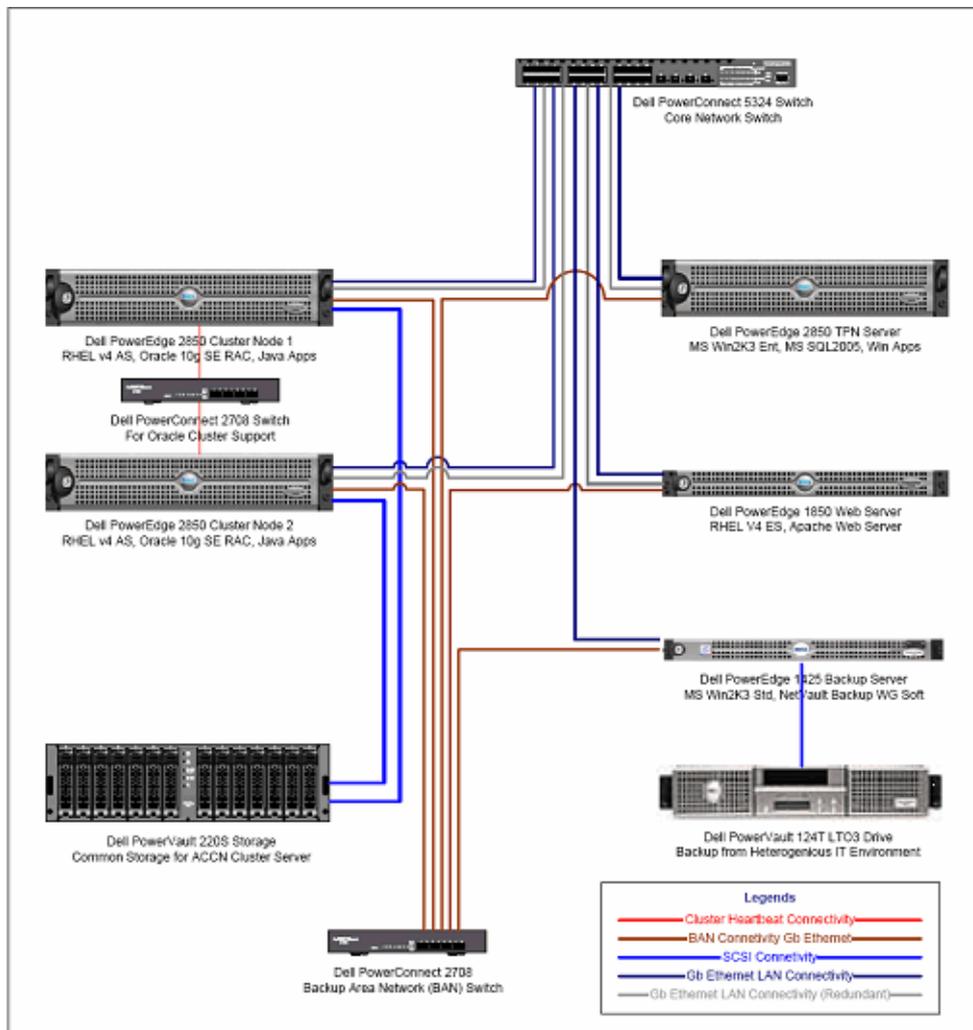
Very High Volume Environment dependent on transaction requirements

Distributors:

Microsoft SQL 2000 / 2005 Standard/Enterprise Edition OR Microsoft's MDBE which is distributed free. This is particularly relevant to smaller Distributor Environments.

4.2. Hardware Requirements

As proposed for a large network:



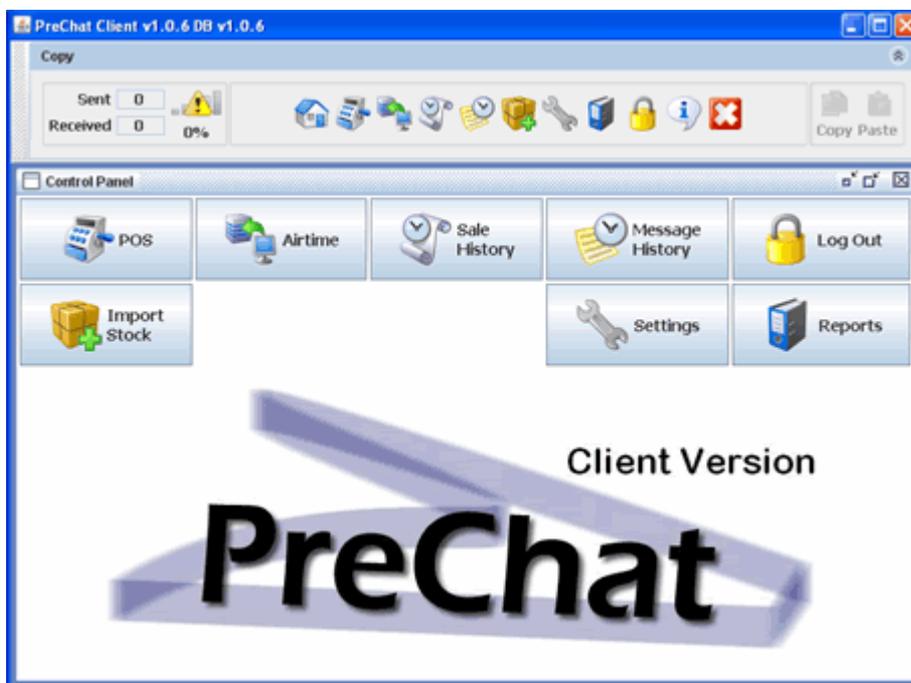
Once again this is dependent on the processing requirements. GSM Network environments should
The following is the recommended hardware requirement to house the PreChat system.

- Recommend:
- Intel Based Server.
 - Dual Processor Intel Xeon >2 Ghz Server
 - 2000MB DDR SDRAM
 - 2 x 40 MG plus SCSI Drives RAID Enabled
 - Network TCP/IP
 - 2-6 SMS/GPRS Modem/s based on anticipated traffic flows.
 - Tape Backups

The system can however be run on lower specified machines but there is a compromise as to speed and consequently prepaid voucher delivery times.

5. PreChat's - PC based POS Client

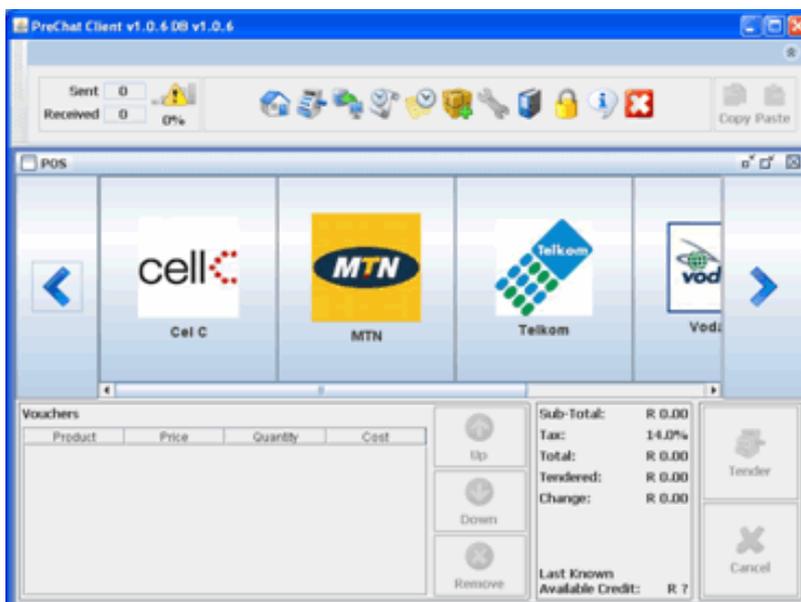
5.1. The PreChat PC Client



PreChat has developed a PC based POS device for distribution to airtime vendors. This enables the selling of airtime via two mechanisms:

5.1.1. POS – Printing of Vouchers

Prepaid Vouchers can be printed via a receipt printer and this which can then be handed to the customer.





PreChat Electronic Voucher Distribution System

Below is a sample print out from the PreChat Client.

```
BackBone Tech
BackBone Tech
Tel: (011) 467-9486
Fax: (011) 467-9484
Date: 2007-10-05 09:07:37
Cashier: konrad
Reference: 107

-----
MTN R.30 #1
PIN: 1000007780000
REF: 100000778
Dial 555...

-----
MTN R.60 #2
PIN: 50000000530000
REF: 5000000053
Dial 555...

-----
MTN R.30 #3
PIN: 1000007790000
REF: 100000779
Dial 555...

-----
Total: R 120.00
Cash: R 120.00
Change: R 0.00

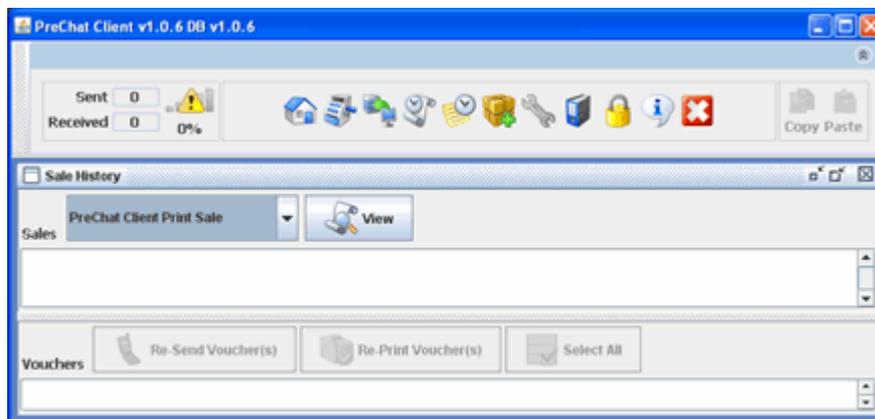
Thank You, Have a nice day...
```

5.1.2. Prepaid Airtime sales directly to the cellphone

It is possible to deliver the prepaid voucher directly to the customer's cellphone via an SMS message.

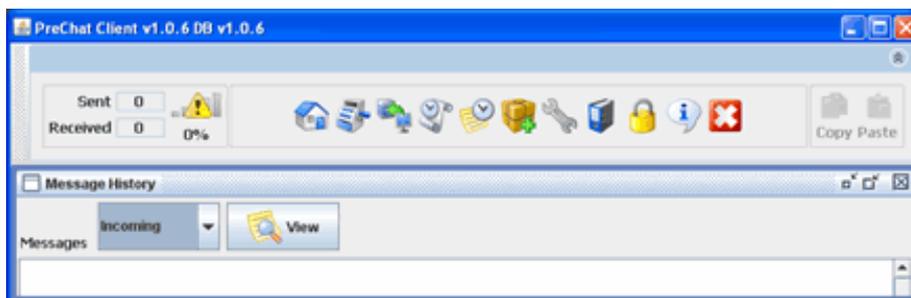
5.2. Sales History

This screen allows a view of all sales and the mechanism via which they were sold



5.3. Message History

This screen allows a view of all messages by category - incoming, outgoing, processed and sent.



5.4. Pre-paid Stock Management

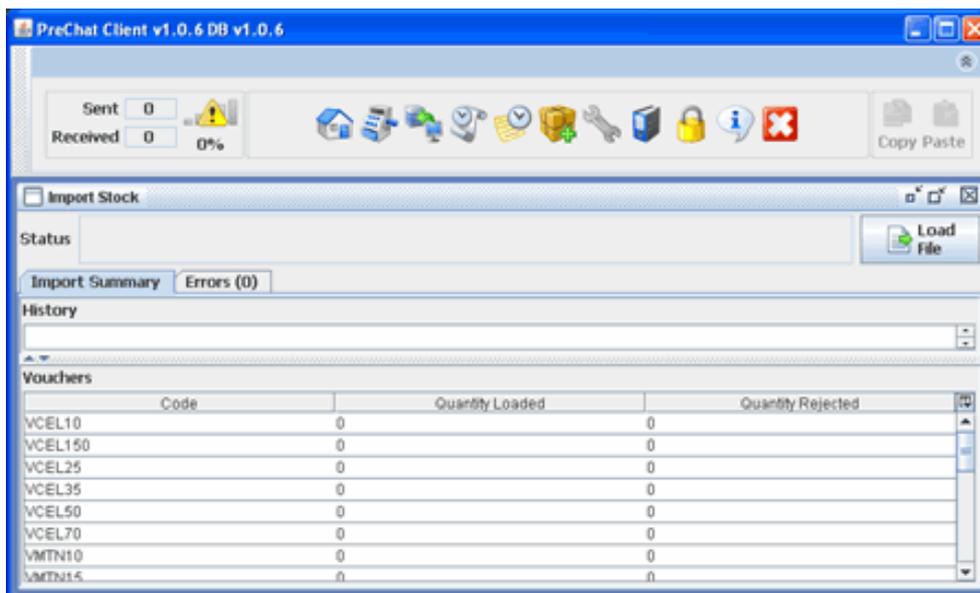
The PC client has access to prepaid airtime via two mechanisms:

5.4.1. XML File Transfer

An order is placed on the PreChat server for prepaid airtime stock this is packaged and sent to the PC client as an encrypted XML file with all prepaid airtime PINS held in an encrypted format.

The XML file is imported into the PC client and where they may be reformatted if this is required.

Shown below is the XML import screen.



5.4.2. SMS based stock management

The PreChat POS client may also draw stock directly from the PreChat server via an SMS. In this instance the client sends an SMS to the server requesting a prepaid voucher, the sever returns the voucher to the system where it may be printed out. There is no requirement to hold stock in this instance.

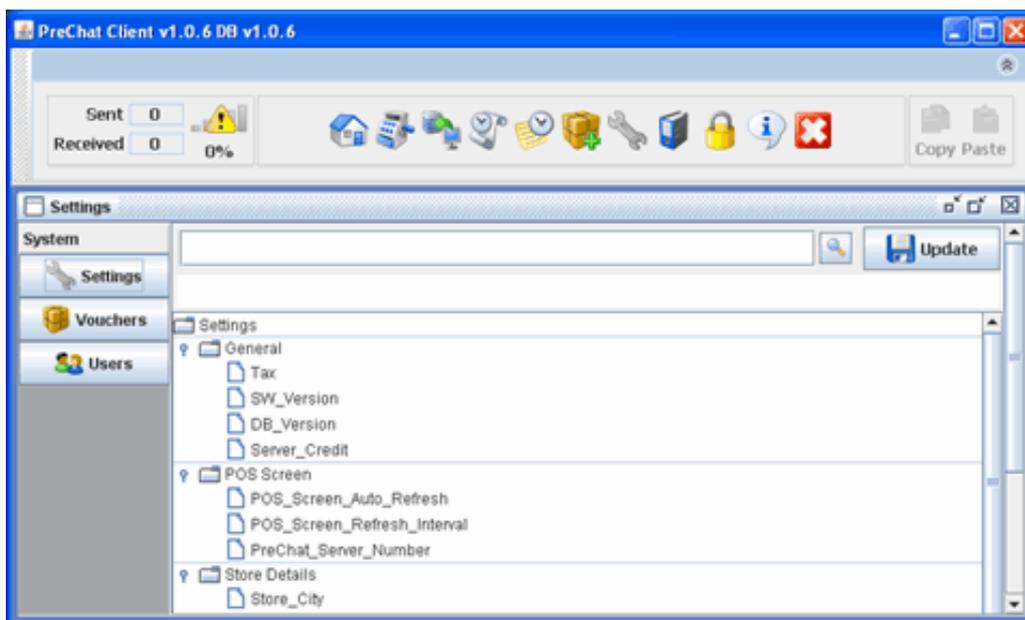
5.4.3. Stock Dispensing Control

The PreChat server will only respond to stock requests if the said server has “credit” available on the system. Checks are done to verify that no stock is drawn against an account without credit availability.

5.5. Client Settings

This is a configuration screen where the client is setup according to requirements in that country.

User management is at three levels – User and Administrator rights as well as screen access profiles that will withhold certain information.



It is at this level that the different prepaid vouchers are also configured.

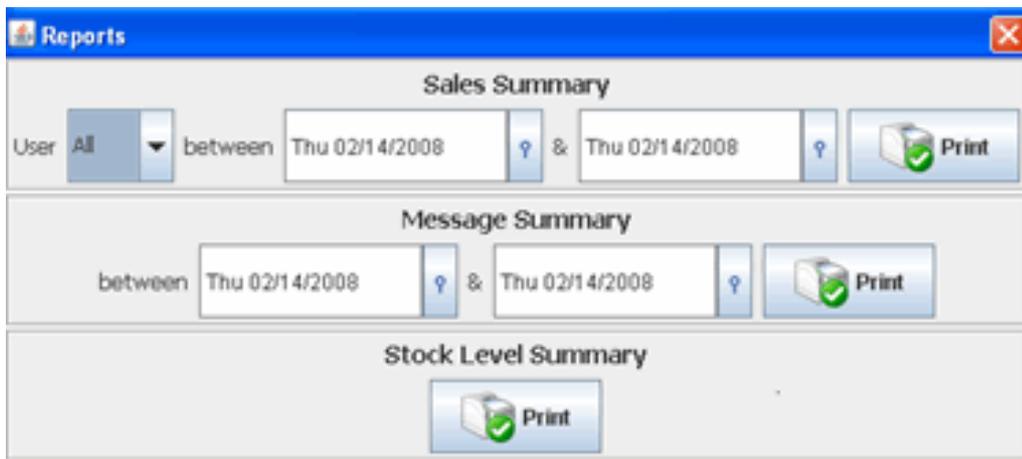
5.6. Reports

This screen allows reports to be pulled from the PreChat Client, Reports Include

- Sales by Users
- Sales by Date
- Messages
- Stock Level Summary

PreChat Electronic Voucher Distribution System

These Reports can be printed out.



The screenshot shows a window titled "Reports" with a close button in the top right corner. It contains three distinct report sections, each with a "Print" button:

- Sales Summary:** Includes a "User" dropdown menu set to "All", followed by the word "between", two date input fields both containing "Thu 02/14/2008", an ampersand "&", and a "Print" button with a printer icon.
- Message Summary:** Includes the word "between", two date input fields both containing "Thu 02/14/2008", an ampersand "&", and a "Print" button with a printer icon.
- Stock Level Summary:** Includes a single "Print" button with a printer icon.