POS is a fully mobile hardware-software solution, which provides payment acceptance from personal clients.

Functioning Principle

With the help of the menu of the payment terminal the manager selects required service for payment, input necessary details (phone number, personal account number, etc.). Then the device sends entered information to server for checking purposes. In the case of success reply by the server the client may insert money into bill validator or/and coin acceptor. The payment terminal automatically detects and validate inserted nominals.

After receiving of the payment request the processing server forward it to the billing server of the service provider with the help of special gateway solution. In the last stage the payment terminal prints receipt to the client, which confirms that the transaction is successfully processed.

The owner of the payment terminal receives fee for this service from the Processing (Payment System) company .

Technical Specifications

iCAN POS solution includes the most comprehensive set of advanced features, management tools and technical support to achieve the highest levels of scalability, security, reliability, and uptime. It may reduces the risk, cost, and complexity in developing, deploying, and managing business-critical applications.

Hardware
K370 POS Terminal

K370 POS Terminal is a leading wireless POS products with high performance, optional added value application function and handhold wireless POS terminals, featured design of 32-bit ARM CPU and high-speed 8-bit dual CPU, built-in high-speed thermal printers, large capacity 32M FLASH and 32M SDRAM Memory with expandable to 64M/128M FLASH/SDRAM, dial-up, GPRS and CDMA supporting, optional to deploy laser scanner, fingerprint identification module and contactless card reader.

Key features:
1. K370 is handheld pos with dual CPU: ARM9 and powerful Linux OS
2. Build-in Li-battery(7.2V 1000mA) makes it easy to use anytime and anywhere;
3. Build-in thermal printer make receipts collection faster;
4. Smart communication modes, Modem/GPRS, with optional Wi-Fi or CDMA;
5. Support optional components, such as barcode scanner, fingerprint reader, contactless card etc.
6. More security design technology appliances: tamper resistant, tamper responsive, tamper evident, all compliant with RSA, DES, 3DES, MAC X9.9, and DUKPT

encryption etc.

7. Popular to commercial application for pre-paid consumption, mobile top-up, member club, malls, taxi fee, petro station etc.

K370 GPRS handheld pos terminal specifications

Item	Specifications
Processor	Dual CPU, Samsung S3C2410 32Bit ARM9TDMI CPU & STC12LE5412 8Bit CPU
Memory	Standard 32MB FLASH, 32MB SDRAM. can be extended to 64MB128MB FLASH/SDRAM, support at least 500 transaction records.
OS	Linux
Power Supply	External switch power Input 100V~240V AC,50/60Hz Output: 9VDC, 4A Embedded 1000Mah/7.2V Li Battery in Handset
Working electric current	power on current:30mA~200mA,stand by mode: 30MA printing average current:1A
Connectivity	1 power port,1 RJ11 telephone port,1 12PIN multi-function portinclude 1 USB HOST,1 USB DEVICE,2 RS232 port
Magnetic Stripe Reader	Track 1/2/3, bi-directional swipe, GB/T 14916,GB/T 15120,GB/T 15694-1,ISO7812-2,GB/T 17552 compliant, life cycle :above 500,000 times
IC Card Reader	EMV Level1& Level2 approved
SAM Slots	2, ISO7816
Printer	High Speed thermal Printer Speed: 5cm/sec, Paper Width:57mm , Support print graphics Life cycle 50 km(above 250,000 pieces receipts
LCD	128*64 FSTN,16 level grey with LED backlight, Display size65*34mm
Keypad	18 Keys with waterproof and dustproof, 10 alphanumeric keys,8 function keys Life cycle: 300,000 times
Pin pad	Embedded pin pad, supports alphanumeric input and display, 3DESANSIX9.9ANS9.8,above 100 secret keys
Modem	Sync (SDLC,9600bps), asynchronous (33.6Kbps) (55.6Kbps optional)
Communication mode	MODEM,GPRS or CDMA (one of them) And can be extern to TCP/IP
Program Language	Standard C, support Second Development
Language	Support English and China 2 level word ,when is Chinese Input through the PINYIN and area code.

Update	Rs232 from Pc, terminal to terminal, remote download, USB download, U disk download
Additional(optional)	Finger printer Laser scanner
size	200*90*60MM
Certifications	China Union Pay pos test,3C, EMV LEVEL1/LEVEL2, PBOC2.0 LEVEL1/LEVEL2, China telecom Access Net license, China Union Pay Magnetic Stripe/IC card pos Access Net license, Visa ADVT , Master Tip

Software

Operating System (OS)

K370 is running on the *Linux operating system.*
Linux is the most popular UNIX-like OS in the world. The Linux kernel is under constant development. Progress on development is very fast. The kernel design is modular, so that the actual OS code is very small yet able to load whatever functionality it needs and then free the memory afterwards. Because of this, the kernel remains small and fast yet highly extensible.

Linux Advantages

Low cost: There is no need to spend time and money to obtain licenses since Linux and much of its software come with the GNU General Public License.
Stability: Linux doesn't need to be rebooted periodically to maintain performance levels. It doesn't freeze up or slow down over time due to memory leaks and such. Continuous up-times of hundreds of days (up to a year or more) are not uncommon.
Performance: Linux provides persistent high performance on workstations and on networks. It can handle unusually large numbers of users simultaneously, and can make old computers sufficiently responsive to be useful again.
Network friendliness: Linux was developed by a group of programmers over the Internet and has therefore strong support for network functionality; client and server systems can be easily set up on any computer running Linux. It can perform tasks such as network backups faster and more reliably than alternative systems.
Flexibility: Linux can be used for high performance applications with any variations.
Compatibility: It runs all common Unix software packages and can process all common file formats.
Fast and easy installation: The Linux distributions come with user-friendly installation and setup programs.
Multitasking: Linux is designed to do many things at the same time; e.g., a large printing job in the background won't slow down your other work.
Security: Linux is one of the most secure operating systems. "Walls" and flexible file access permission systems prevent access by unwanted visitors or viruses.

Open Source: The Linux source code is freely available to everyone, and everyone can contribute to its development. This effectively added thousands of programmers to the Linux development team. The large number of Linux developers yielded an operating system of unprecedented efficiency and robustness, with countless freely available software packages.

Arm Linux OS

Linux has already made serious inroads into the embedded market and is expected to become the dominant OS in this area. Linux proved itself suitable for embedding into many sizes of projects from extremely small to extremely large. Linux has proven to perform well in soft real-time situations and hard real-time solutions are available if needed.
In addition to being the embedded OS, Linux offers itself as the ideal development platform. Cost, utility and reliability ensure that it is the right choice.

The advantages of embedded Linux over proprietary embedded operating system include multiple suppliers for software, development and support;

- Royalty free licensing

- Reliable IP stack and TCP/IP Applications

- Source code for the OS Kernel is Open

- Source code for the Toolchains is Open

- Multiple choices vs. sole source

- Robust and reliable

- Modular, configurable, scalable

- Superb support for networking and Internet

- Large pool of skilled developers

- It is very modular in nature, since all features of the system that are not needed for a specific embedded system can be removed from the kernel.

Libraries/technologies

iCAN added very valuable libraries/technologies to the embedded Linux platform:

1. libcurl - for data exchanging over Internet connection

2. libxml2 - for parsing and manipulation of XML data

3. libssl + openssl (shell) - for encryption and digital signature

4. libsqlite3 - for local storing and further processing (queues, reporting) of application data

The manufacturer of K370 (XGD) provides SDK. It is consisted of the ARM-Linux compiler and XGD develop environment(EFT-POS).
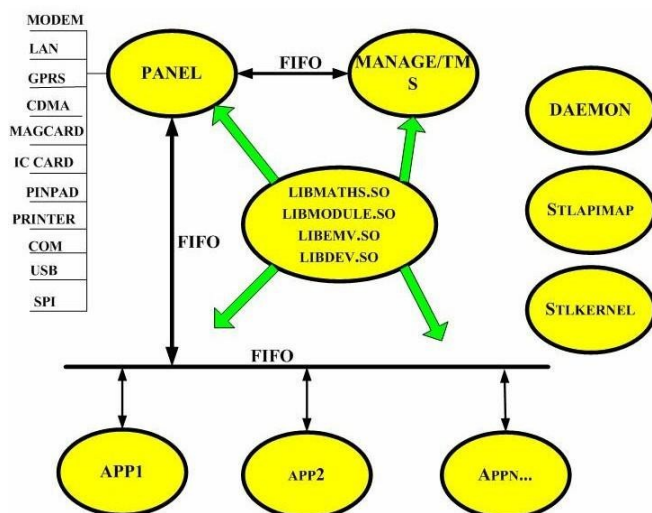
EFT-POS is the secondary development platform for POS Terminal by XGD. It uses cross-platform distributed middleware technology to make full use of system resource for better balancing the interfaces between application and kernel drivers, which make the application developments easier and more effective.

The bottom libraries include driver library, mathematical library, module library, EMV library and so on.

As we have seen, such as libmaths.so, libmodule.so, libemv.so, libdev.so and so on. The function of driver library is that drives BIOS, COM, LCD, Real-Time Clock, printer, touch screen and so on.

Mathematical library provides a series of mathematical functions and implements the data processing .The function of module library includes the system settings, control the input method, the daily record and file recordings, some interface functions that commonly used and so on. EMV library provides some functions of EMV validation for IC Card.
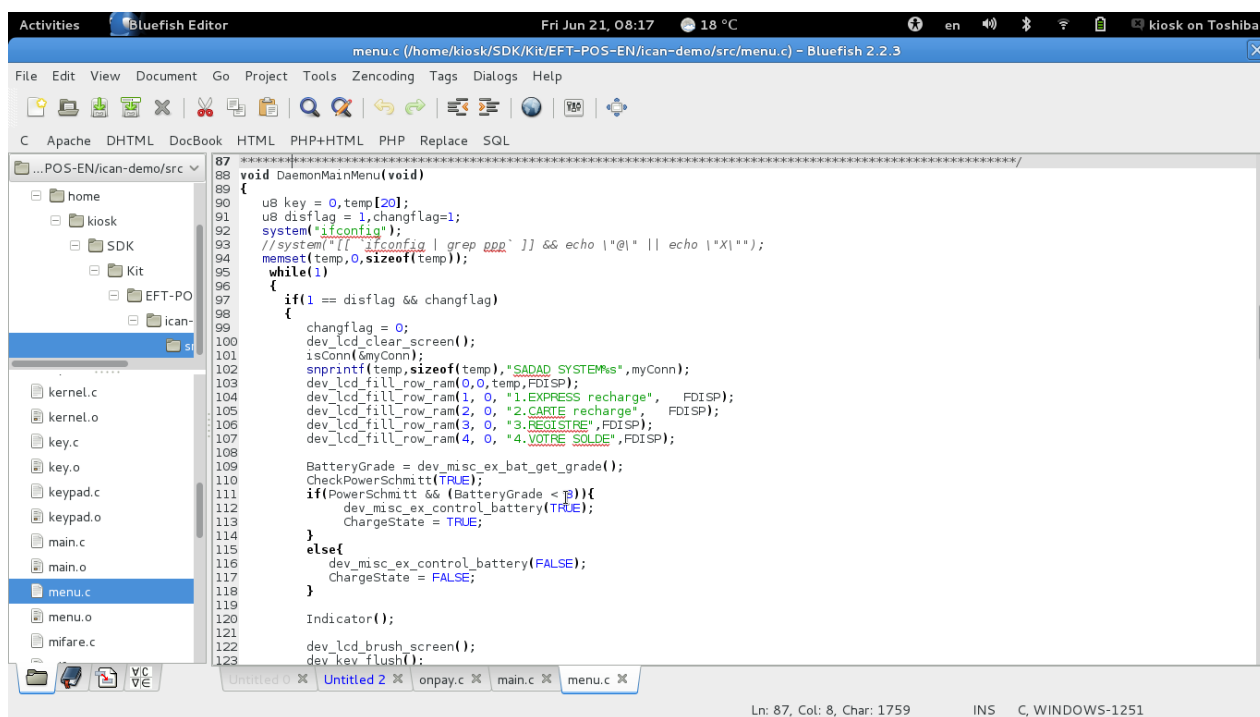
Application

The application is developed using C language, PHP and Linux shell scripts. The backend database is Sqlite. The cURL is used for sending HTTP requests and receiving XML replies. As the security it is provided with the help of OpenSSL.

The application has modular architecture, which allows to save CPU, Memory and other hardware components.
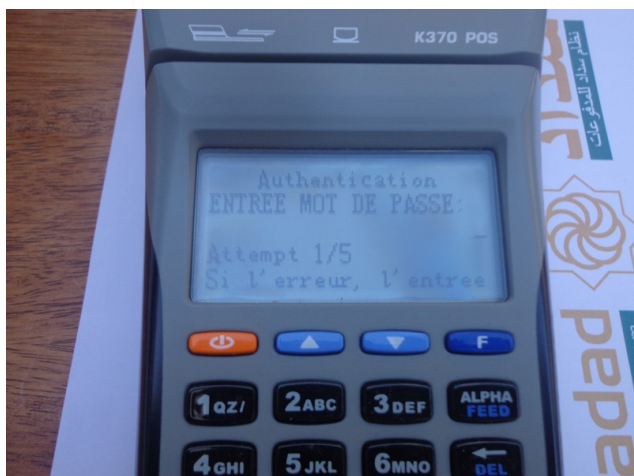
Source Code example

HOW IT WORKS

Startup description

The POS device switches on with the help of "Power On/Off" button. During the start-up operation the company logo is displayed with "Loading..." notification. After initiation process the Authentication prompt is displayed. It gives user 5 attempts to enter correct password.

The device initiates connection with the server procedure, if the authentication is successful. Otherwise the device hangs up automatically.

The main menu consists 5 independent menus:

• EXPRESS RECHARGE

• CARTE RECHARGE

• REGISTRE

• VOTRE SOLDE

• LANGUE
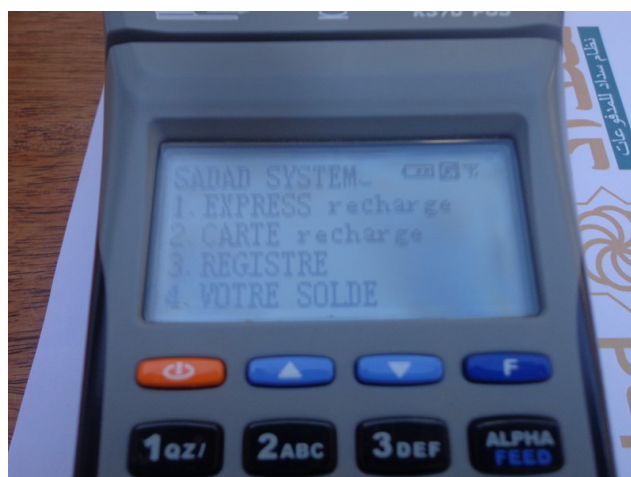
Additionally there are 2 hidden features, which are activating with the help of "0" and "CLR" buttons:

1. SOFTWARE UPDATE – "0"

2. CERTIFICATE - "CLR"

EXPRESS RECHARGE

a. Description

This sub-menu allows the user to run recharge operations.

The following items are displayed sequentially:

• The phone number of the client;

• The amount of the charge. (4 digits are supported)

Finally the confirmation prompt is displayed

Enter Phone Number (10)

0660123456

CANCEL / ENTER

The home menu is displayed, if the user chose the "CANCEL" option.

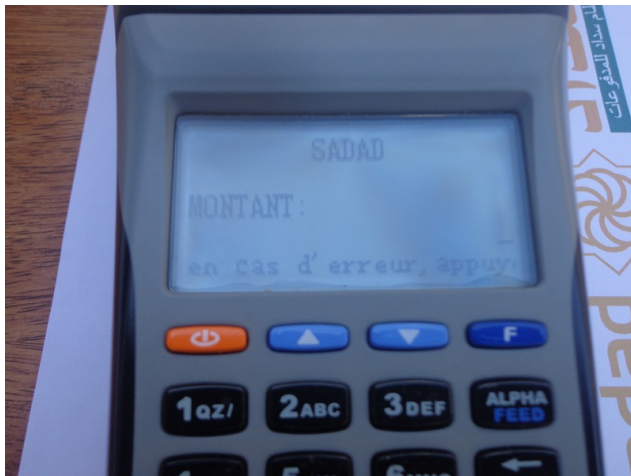The next step is displayed, if the user chose the "ENTER" option.

Amount (DH)

100

CANCEL / ENTER

The home menu is displayed, if the user chose the "CANCEL" option.

The next step is displayed, if the user chose the "ENTER" option.

Confirmation

Tel: 0660123456

Amount: 0100

CANCEL / ENTER

The home menu is displayed, if the user chooses the "CANCEL" option.

In the case of confirmation, the payment operation is performed.

The result of the transaction is printed as the receipt.

Receipt printing

Successful transaction

In the case of a successful transaction, the contents of the ticket is detailed below:

Failed transaction

In the case of a failed transaction, the contents of the ticket includes the content of

SMS received as shown in the examples below

X

CARTE RECHARGE

a. Description

This sub-menu allows the user to run card recharge operations and print recharge code on the receipt.

The following items are displayed sequentially:

• Card nominals (1,2,5,10,20,30,50,100...);

• The quantity of the cards. (2 digits are supported)

Finally the confirmation prompt is displayed
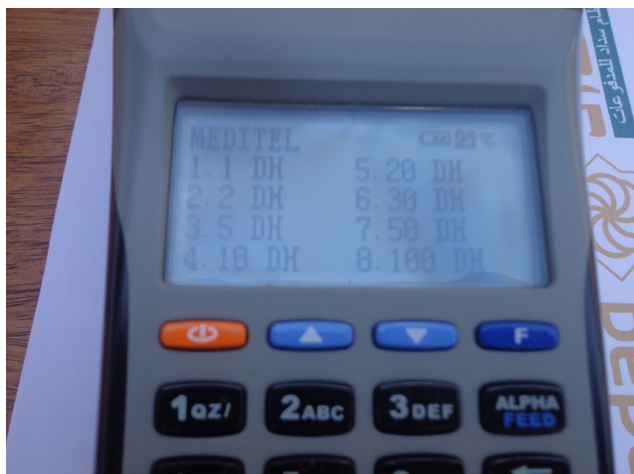
Choose a card nominal

1,2,5,10,20,30,50,100...

CANCEL / ENTER

The home menu is displayed, if the user chose the "CANCEL" option.

The next step is displayed, if the user chose the "ENTER" option.

Quantity

2

CANCEL / ENTER

The home menu is displayed, if the user chose the "CANCEL" option.

The confirmation prompt is displayed, if the user chose the "ENTER" option.

Confirmation

Nominal: 30

Qty: 1

CANCEL / ENTER

The home menu is displayed, if the user chooses the "CANCEL" option.

In the case of confirmation, the payment operation is performed.

The result of the transaction is printed as the receipt.

Receipt printing

Successful transaction

In the case of a successful transaction, the contents of the ticket is detailed below:

Failed transaction

In the case of a failed transaction, the contents of the ticket includes the content of

SMS received as shown in the examples below

X

REGISTRE

This sub-menu allows the user to view the history of operations in the following format:
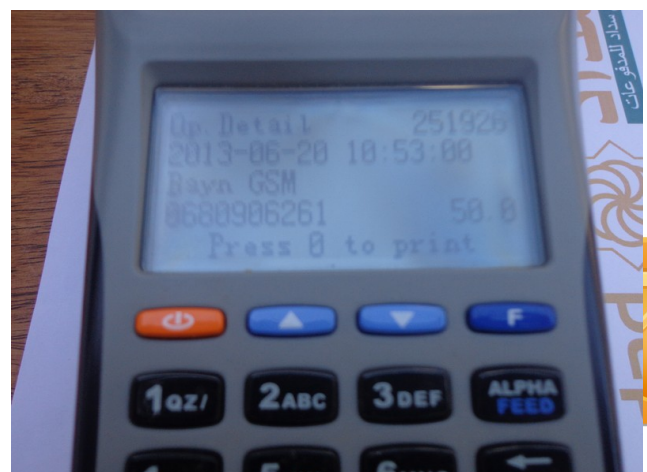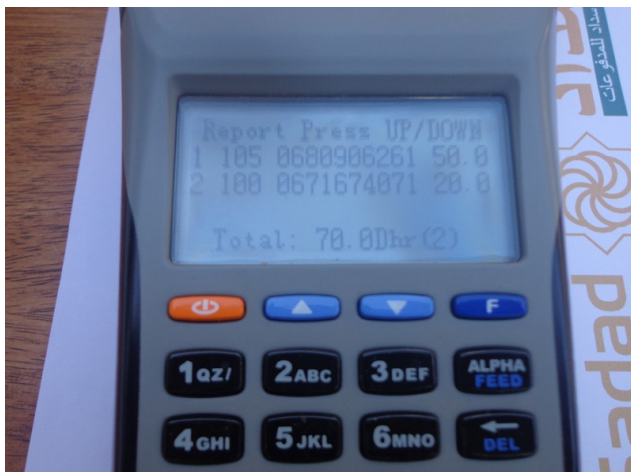
SELECT ITEM|MSISDN | AMOUNT | TIME
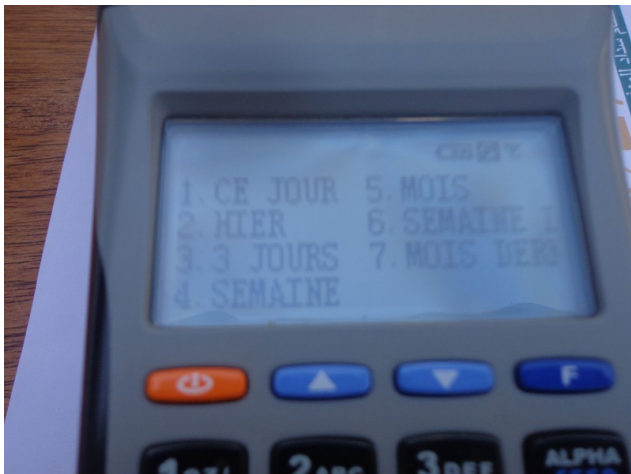
example:

1 | 0660123456 | 0020 | 16: 21

2 | 0664987456 | 0100 | 17: 59.

The user may print list of operations or the receipt of the selected item (DUPLICATA FACTURE

) with the help of "0" button .

There are 8 options in this sub menu:

1.CE JOUR

2.HIER

3.3 JOURS

4.SEMAINE

5.MOIS

6.SEMAINE DERNIERE

7.MOIS DERNIER

8. RECHERCHER

The RECHERCHER sub-menu allows the user to search transaction by the Transaction Id (printed in the receipt)

SOFTWARE UPDATE

It allows to update software manually getting new versions directly from the update server. Alternatively the update procedure may be launched automatically with the help of Linux cron (a time-based job scheduler).
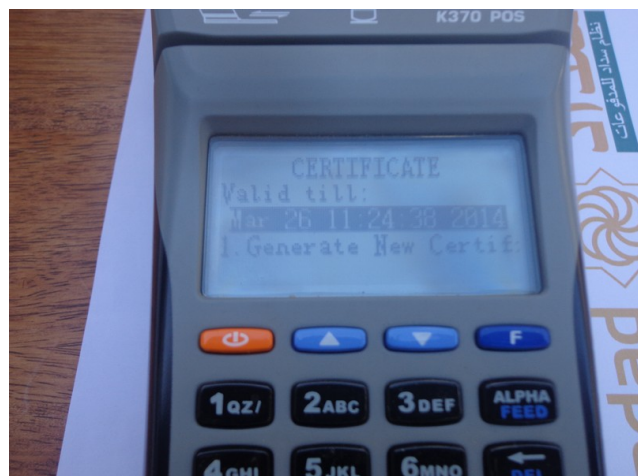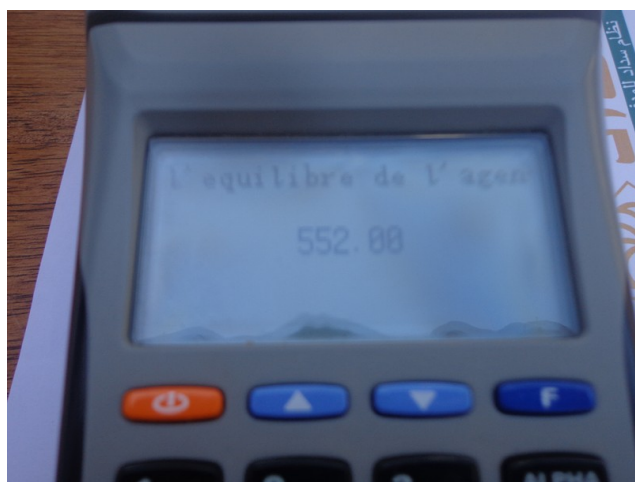
CERTIFICATE

It is used to manage cryptographic keys, which are used to secure communication with the server.

The user has options to check expiration date of certificate and generate new one, if the validity date was expired.

VOTRE SOLDE

This menu allows the user to check a balance

LANGUE

This menu allows the user to view / set the language (French, Arabic)

OTHER

The application supports all described features for the dealers in the "Fourniture et mise en place d'une solution Terminal de Paiement " document.

We can also provide specific reporting and printing formats in according Mobile Operator requirements.

iCAN offers full featured IP stack and TCP/IP protocol for communication with the processing server based on the back-end architecture.