Radioactive Networks

iServ System Manual
Version 0.0.3

Table of Contents

Introduction

Welcome to Radioactive Networks and our iServ product. This product is a new software package designed for tracking vehicles, and job management. Using in-vehicle terminals and GPRS modems, we are able to provide a unique set of capabilities.

The product allows remote messaging and position monitoring over an network, and storing all data into a database for future reference, and billing as required.

System Requirements

The system has a number of dependencies. Some are mandatory, and some are optional.

Server	PC running Windows 2000 or Windows XP	Mandatory
	512 Mbytes RAM	Mandatory
	Internet Access with Permanent IP address	Mandatory
	Microsoft Access	Optional
Messaging and Reporting Station	PC running Microsoft Windows 2000 or Windows XP	Mandatory
	256 Mbytes RAM	Mandatory
	Microsoft Access	Recommended
Position Monitoring Station	PC running Microsoft Windows 98 or better	Mandatory
	128 Mbytes RAM	Mandatory

Copyright

The iServ system is protected by copyright and should not be copied without our expressed written permission. Certain components are licensed from other parties and are only distributed in accordance with their license conditions.

Other Documents

This manual should be read in reference to a number of other documents.

Disclaimer

The entire iServ system uses best effort delivery to move data around, log it to a database and display it at a number of locations. Through its very nature, such a system is complex, and errors may creep in. Radioactive Networks may not be held liable for the failure of our software other than the rectifying the software.

The in-vehicle equipment should be used in a manner that does not distract the drive, and is used in a legal manner. Radioactive Networks will not accept any liability relating to the use or misuse of the in-vehicle units. Some jurisdictions do not permit the use of in-vehicle computers. Care should be taken to ensure that your jurisdiction allows for their installation.

Acknowledgements

Radioactive Networks would like to acknowledge the support of our contract programmer, Kevin Dawson. Without his work, we would have been unable to complete this project. His professionalism has made this product what it is today.

Software Architecture

The iServ system is made up with a number of separate components that are brought together to create a full application. These components can be combined to suite specific requirements.

The components include
- iServ
- iLog
- iMessage
- OziAPRS – APRS for OziExplorer
- iTrack (Future)
- Embedded GPRS Modem
- Mobile Data Terminal

iServ

The central part of the system is the iServ application. iServ is a server for the other applications, logs messages coming in and routes messages. The server will accept data from iMessage, M110 GPRS Tracking Units, Net960 Mobile Data Terminals and NetGPS PDA's.

The application logs messages and jobs using XML for database logging by XML.

iLog

iLog is a database logging component. It takes XML files exported from iServ, and writes them into the database. iLog is a separate component to simplify issues in case of problems with the database. The XML files can be imported at a later date to reconstruct a corrupted database. Alternately, the XML files can be easily imported into different databases of different platforms.

iMessage

The message and job entry application is known as iMessage. It is where operators are able to assign work requests, and monitor messages.

iTrack

iTrack is a product for displaying maps in OziExplorer using the WWW to transfer data. iTrack is not yet being distributed, but will be in the future.

OziAPRS – APRS for OziExplorer and MapPoint

OziAPRS is a vehicle position monitoring system for OziExplorer and Microsoft MapPoint.

Embedded GPRS Modem

The embedded GPRS modem acts as an interface between the GPRS Radio Network, and the Mobile Data Terminal. It contains an entire TCP stack, and reduces the complexity of the mobile data terminal software.

The exact model of the GPRS modem depends on the requirements of the installation.

Mobile Data Terminal

The mobile data terminal is a 386ex computer with 8 line 40 character display, flash memory and an internal modem for voice communications. The Mobile Data Terminal acts as the interface for the user.

The Mobile Data Terminal contains proprietary software developed by Radioactive Networks.

Setup

Installing the software

The software package is based on the Microsoft .NET architecture. The first step in installing the software is to install the .NET runtime libraries. This may lead to needing to reboot the machine several times.

Installing iServ

iServ should be installed c:\program files\iServ\iSev

Installing iLog

iServ should be installed c:\program files\iServ\iLog

Installing iMessage

iMessage should be installed to c:\program files\iServ\iMessage

Installing OziAPRS

OziAPRS should be installed to c:\program files\OziAPRS. Unlike the previous three products, OziAPRS does not use the .NET runtimes and can be installed on a wider range of computers

Installing OziExplorer

OziExplorer should be installed into C:\Program files\OziExplorer.

Configuring Directories

iServ needs to be configured with three directories that XML files will reside for uploading into the database. These directories will need to be created, and the settings changed in iServ.

We recommend that the following directories are created and used

> C:\Program Files\iServ\XML\Upload
> C:\Program Files\iServ\XML\Error
> C:\Program Files\iServ\XML\Done

Once the directories are created, the directories will need to be changed in iServ. They can be entered in the DataBase menu. Once the three directories have been entered, iMessage and iLog will need to be restarted.

Database

iServ and iLog need access to the iServ Database. We recommend that this database is copied to

C:\Program Files\iServ\Database\[ClientName].MDB

Once this file is copied to the desired location with the correct filename, it needs to be entered into iServ, under the Databases menu. Once it has been entered, you will need to restart iServ and iMessage.

Application License Files

Various programs supplied use license files of one type or another to restrict unauthorized usage. We suggest that you record the license file details on the lines bellow.

OziExplorer

The OziExplorer software comes with two numbers of the form
1234-5678-9012
$00001111

These numbers will need to be entered into OziExplorer as per the instructions that are included with the software.

__ __ __ __ - __ __ __ __ - __ __ __ __

$ __ __ __ __ __ __ __ __

OziAPRS

The OziExplorer software required you to enter two pieces of information in the Register area under the Help menu. These are an EMAIL address and registration key. The numbers are of the form

test@radio-active.net.au
123456789ABC

_____

—— —— —— —— —— —— —— —— —— —— ——

OziExplorer Map Files

A number of different maps need to be installed. The licenses for these are included with the CD's. Details on installing these disks can be found on www.gpsoz.com.au

iServ, iMessage, iLog

The OziExplorer software required you to enter two pieces of information in the Register area under the Help menu. These are an EMAIL address and registration key. The numbers are of the form

test@radio-active.net.au
123456789ABC

Email _____

iServ   —— —— —— —— —— —— —— —— —— —— ——

iMessage   —— —— —— —— —— —— —— —— —— —— ——

iLog   —— —— —— —— —— —— —— —— —— —— ——

Software Operations

In order to use this software, the iServ and iLog applications MUST be running.

Should iServ not be running, field units will be unable to contact the database or connect to the receive jobs and messages. As a result it is vitally important that iServ is running at all times.

iLog is not as critical. Its job is to write entries into the database storing where vehicles were at a particular point in time, and which jobs were worked on. The iLog application reads XML files and moves them when finished with them. If it is not running, the database will not reflect the current status of the system.
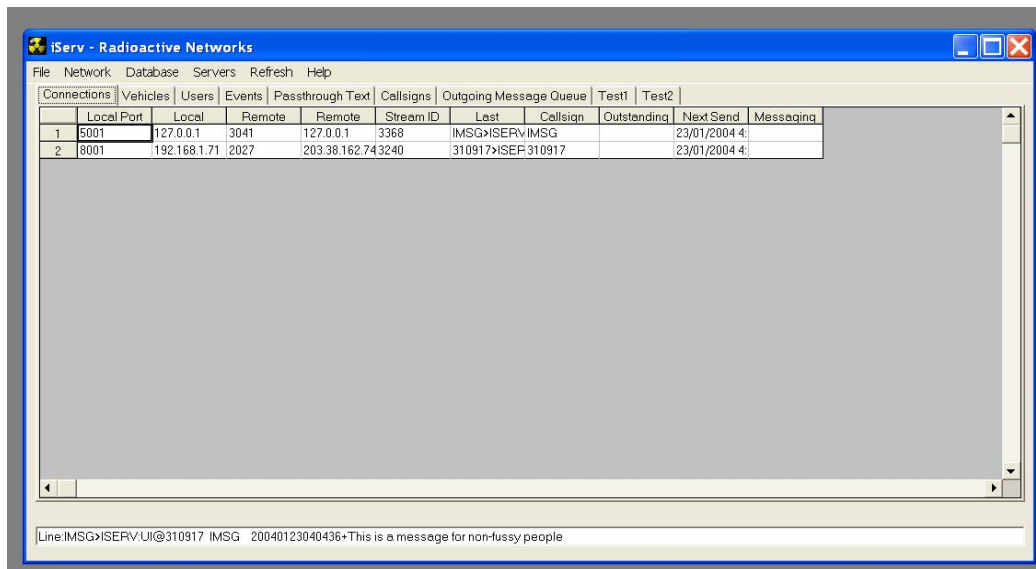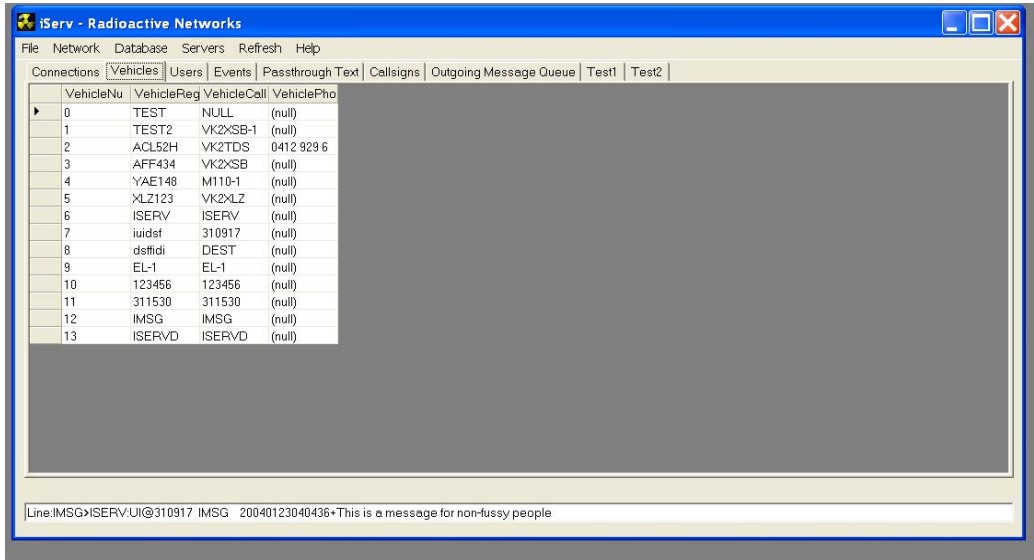
Software Components

iServ

Connections Screen

The connections screen contains one line for every connection to the server. Connections can be manually killed by clicking on the button at the end of the line corresponding to the connection.
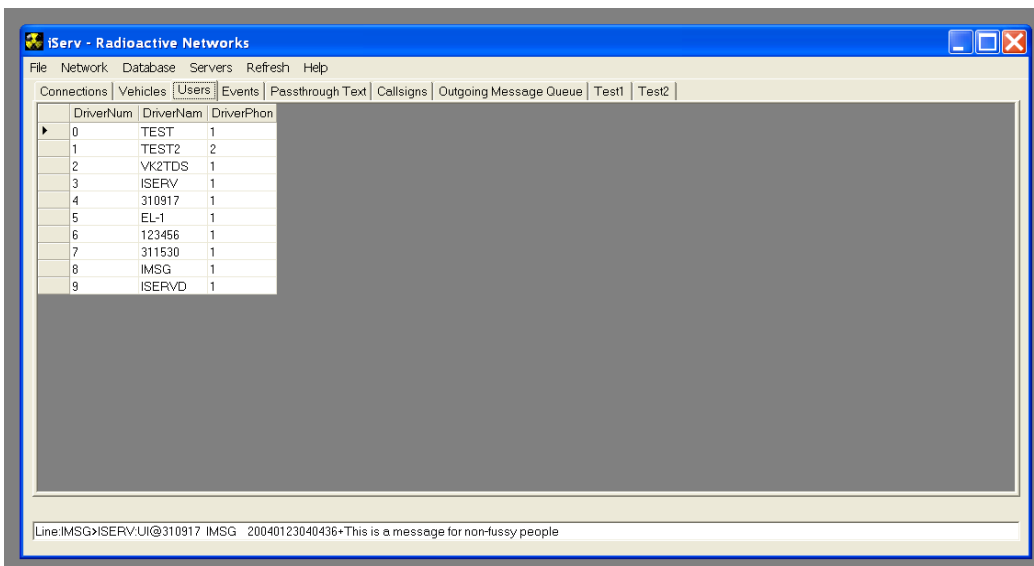
Just because a connection appears on this table does not mean that the connection is working. With a GPRS connection, there will often be cases where zombie connections exist.
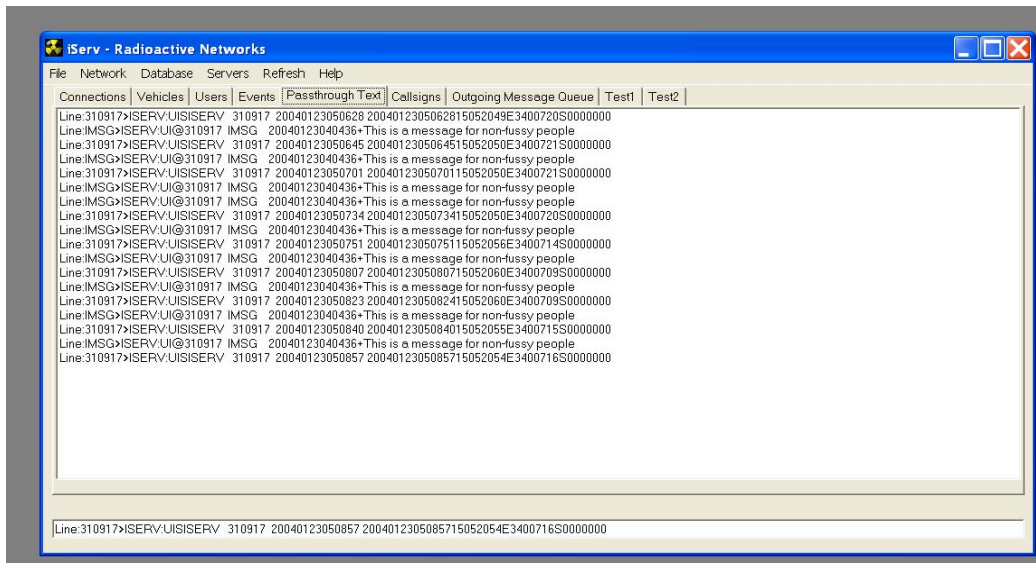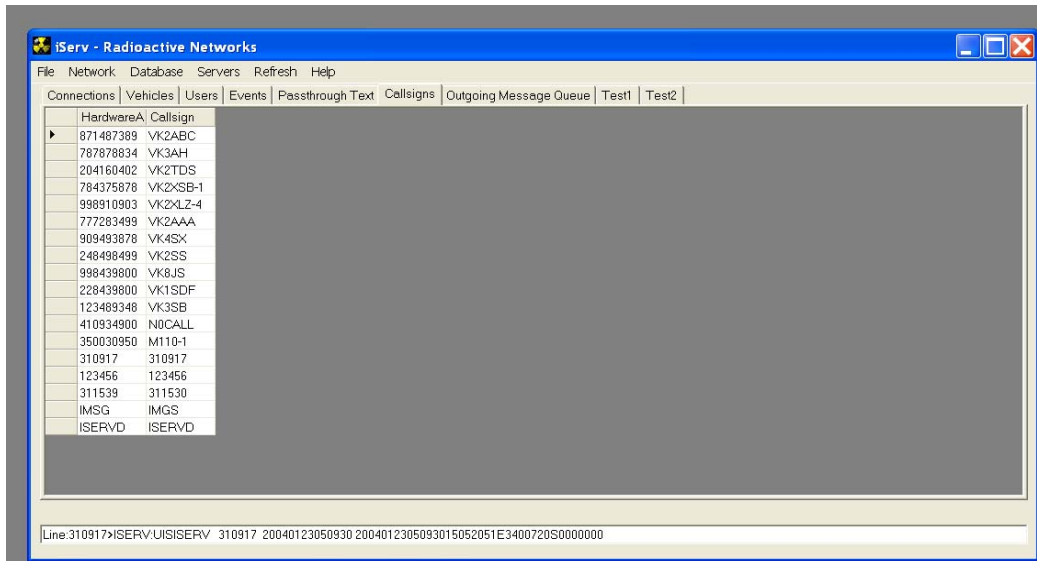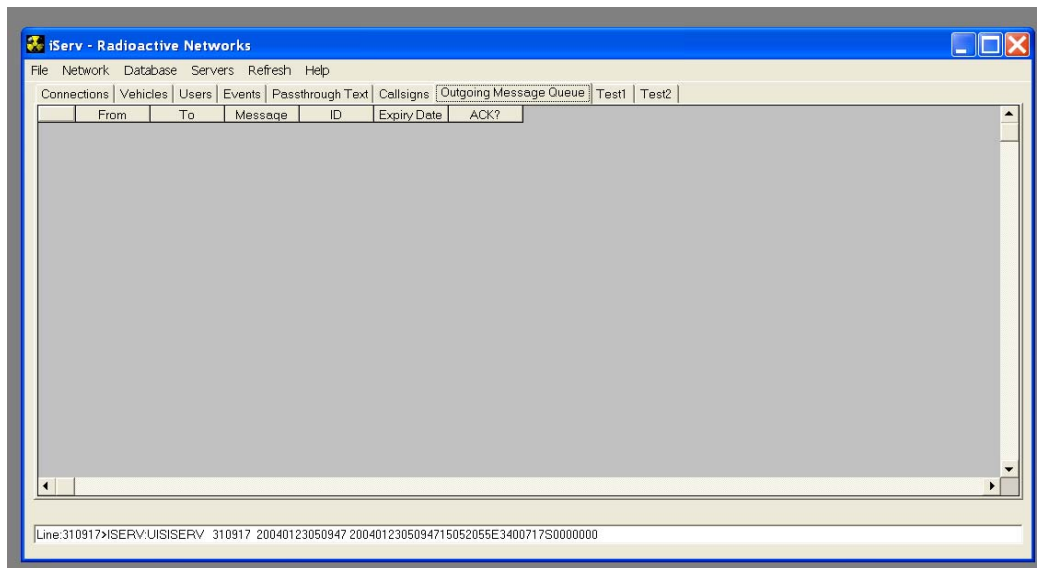

Vehicles List Screen

Users List Screen

Pass-through Text Screen

iServ - Radioactive Networks

File Network Database Servers Refresh Help

Connections | Vehicles | Users | Events | Passthrough Text | Callsigns | Outgoing Message Queue | Test1 | Test2 |

```
Line:310917>ISERV:UISISERV  310917  20040123050628 200401230506281S052049E3400720S0000000
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:310917>ISERV:UISISERV  310917  20040123050645 200401230506451S052050E3400721S0000000
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:310917>ISERV:UISISERV  310917  20040123050701 200401230507011S052050E3400721S0000000
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:310917>ISERV:UISISERV  310917  20040123050734 200401230507341S052050E3400720S0000000
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:310917>ISERV:UISISERV  310917  20040123050751 200401230507511S052056E3400714S0000000
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:310917>ISERV:UISISERV  310917  20040123050807 200401230508071S052060E3400709S0000000
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:310917>ISERV:UISISERV  310917  20040123050823 200401230508241S052060E3400709S0000000
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:310917>ISERV:UISISERV  310917  20040123050840 200401230508401S052055E3400715S0000000
Line:IMSG>ISERV:UI@310917  IMSG   20040123040436+This is a message for non-fussy people
Line:310917>ISERV:UISISERV  310917  20040123050857 200401230508571S052054E3400716S0000000
```

Line:310917>ISERV:UISISERV 310917 20040123050857 200401230508571S052054E3400716S0000000

Callsign List Screen

Outgoing Message Queue Screen

Latest Positions Screen

iLog

iLog is the part of the iServ suite that logs messages received by the iServ application, and places them into the database. The application is external to the iServ application to improve reliability of the system as a whole.
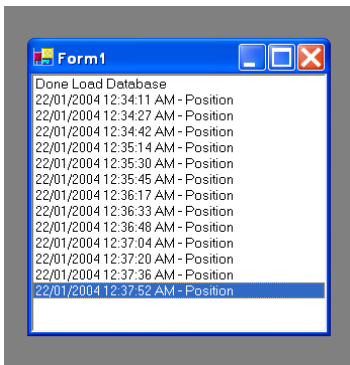
On starting up, the program waits for about 10 seconds for all the database connections to start up. Once this happens, the application starts listening for messages to log to the database.

iMessage

Logon Screen

On opening the iMessage application, the user is presented with the Logon
Screen. In the future this screen will have the ability for the user to enter a
username and password. At the current time, all the user can do is click the
'Logon' button.

Pressing the button sends a message to the server informing it that the user
has just logged on. It also then requests an update on all open messages
from the database, and a list of all the users of the system.

Live Data Screen

The Live Data screen is an overview screen that shows what has been happening on the network. It monitors all traffic between stations and from the server to the station. The data on this screen is updated in real time.

The data can be cleared with the 'Clear Live' button. The data is not saved when the program is shut down and restarted.

All Jobs List Screen

My Jobs List Screen

Job Request Screen
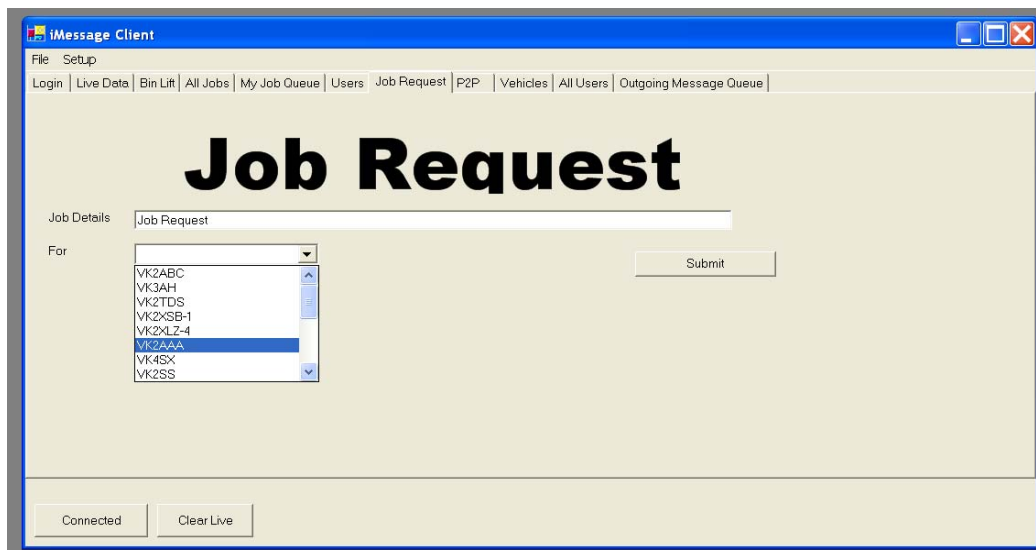
P2P Message Entry Screen

Outgoing Message Queue Screen

Bin Lift Screen

OziAPRS & OziExplorer
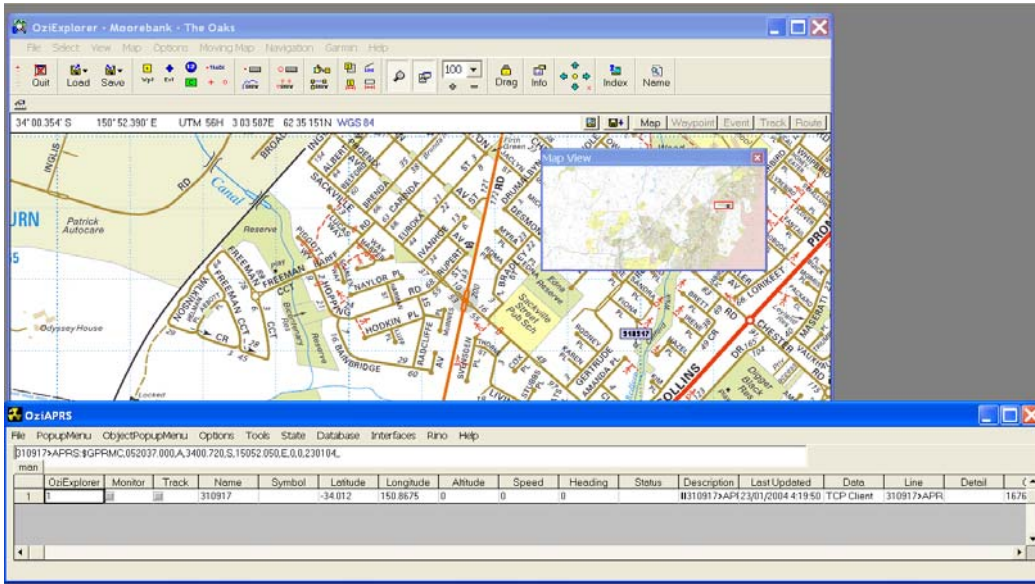
Mobile Data Terminal Operations

Concepts

There are two main types of information sent to the Mobile Data Terminal (MDT), and it is important to recognize the difference between these types of messages. The two types of messages are "Jobs" and "Person to Person (P2P) Messages".

Jobs can only be assigned from the server, whilst P2P Messages can be initiated from either end.

Incoming Messages

When a message comes in to the MDT, the RED light labeled "MSG" will flash. This is an indication to the user that there is a message that has not been acted on.

For a Job, there are two actions that can take place. They are Accept the Job, or Decline the Job. If the user Accepts the Job, the job is then placed into a queue of jobs to be closed at a later date, usually with a bin lift. If the job is declined, the MDT sends a message back saying that it has been declined, and the user has nothing more to do with that job.

With messages, there are two (three) possible actions. The first is "OK" says to the MDT that the user is no longer interested in this message, and that it can delete the message.

Pressing Archive tells the MDT that the user has read the message, but not to delete it yet.

Reply allows the user to reply to the person who sent the message.

Lights and Icons

There are two lights, and three icons on the screen.

Red Light

A flashing red light means that there is an incoming message that has been received, that has not been acknowledged in any way.

Green/Yellow Light

 A green/yellow light means that there are messages in the MDT that have yet to been successfully received by the server. Because position reports are sent each minute, this light will come on at least momentarily every minute. If this light stays on it means that messages will not be seen by the server.

GPS Icon

 The GPS icon means that the GPS is operating correctly, and has located enough satellites to determine its position.

01/10 Icon

The 10/01 Icon means that the unit believes that it is in contact with the server. Because of the operation of GPRS, there will be cases where the 10/01 icon is lit, but there is no real connection. In such a case the icon will go out after a couple of minutes.

Job Flowchart


```
        Job is received
          by the MDT
               |
               v
          View the Job
               |
               v
          Accept or
        Decline the Job
               |
               v
Job is Declined. <----- <diamond>
No Further Action
               |
               v
          Job is Accepted
               |
               v
          Do a Bin Lift <------------+
               |                      |
               v                      |
            <diamond> -----> More bins to lift
               |              on this job
               v
          Close Job
```
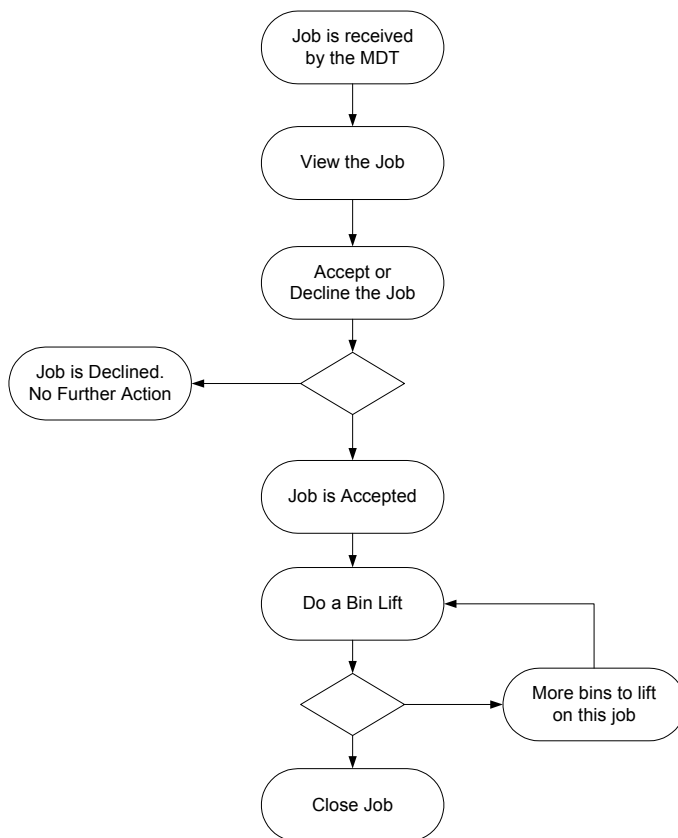
Bin Lift

Press the JOBS (F2) key, and rotate the dial CLOCKWISE until the message 'New Job' appears on the screen.

Once 'New Job' is selected, press the 'ENT' key. You can then enter the BIN NUMBER.

Enter the BIN NUMBER and press 'ENT' when finished. You will then be asked for the condition of the bin.

Use the dial to select the correct option and press the 'ENT' key. Once you have done this, you will be returned to the JOBS menu.

Message Menu

Control Screen

The control screen contains a number of functions that are useful for changing the personality of the unit, and for debugging. They are functions that are not normally needed, but can be accessed as required.

The functions that are presently implemented include
- Changing the Backlight Level
- Examining the GPS signals
- Examining the flow of messages to the server.

Telephone

The phone in the Net960 uses a Cellphone, and therefore can only operate when in cellphone range.

Access Control

The access control for the telephone sub-system is based on levels of access. Each level of access is by design includes all the privileges of the lower levels. Each phone number in the phonebook on the MDT is also given a level. This allows different phone numbers to be rung depending on who is dialing.

The default level of access is defined as 1, allowing all incoming phone calls, and any level 0 and level 1 phone numbers to be dialed. Level 0 is reserved for times when there are to be no incoming calls answered, and only any numbers on the level 0 list may be dialed.

Access of level 9 also allows any phone number to be dialed on the keypad.

Tasks

Adding New Vehicles

New vehicles need to be added periodically. These vehicles need to be added to the database in order to operate correctly. The following fields need to be added

- Vehicle Number
- Vehicle Registration
- Vehicle Callsign
- Vehicle Phone Number
- Vehicle Last Driver Number

The vehicle number is a short number used internally by the software – and must be unique. The vehicle registration is the license plate of the vehicle in Upper Case. The Callsign is also commonly also the license plate, but can be any 3-8 character identifier for the vehicle. The phone number field is only for reference to act as a phone book. The Vehicle Last Driver field is used by the software internally.

To add a new vehicle

- Start iServ
- Select the Update | Vehicle Details menu
- Enter Password when asked
- Select the Vehicles TAB in iServ
- Add a new entry as required, ensuring that the cursor leaves the line following the addition
- Select the Update | Vehicle Details menu once more to save the changes
- Check to make sure that the changes have worked.

Adding translations from Net960 Serial Numbers to Callsigns

By default the Net960 units use their own serial number when communicating with the iServ system. This is not what the users commonly required. A database translation table has been created to convert from the serial number into an easier to recognize string.

Two entries are required – the Hardware Address which is the six digit serial number, and the Callsign, which is commonly the registration plate.
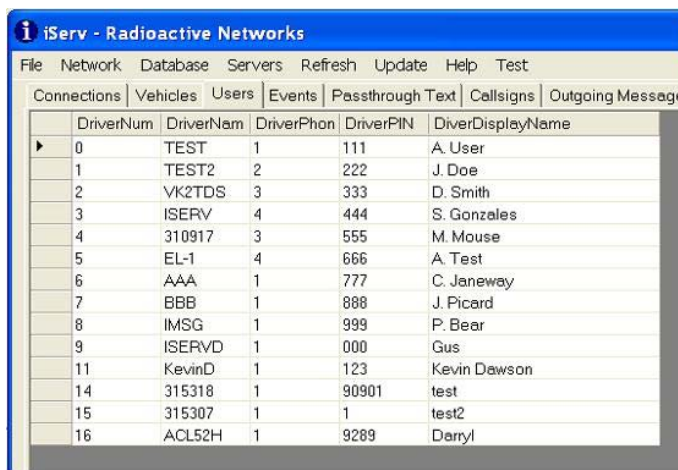
To add an entry in the translation table

- Start iServ
- Select the Update | Hardware Addresses menu
- Enter Password when asked
- Select the Callsigns TAB in iServ
- Add a new entry as required, ensuring that the cursor leaves the line following the addition
- Select the Update | Hardware Addresses menu once more to save the changes
- Check to make sure that the changes have worked.
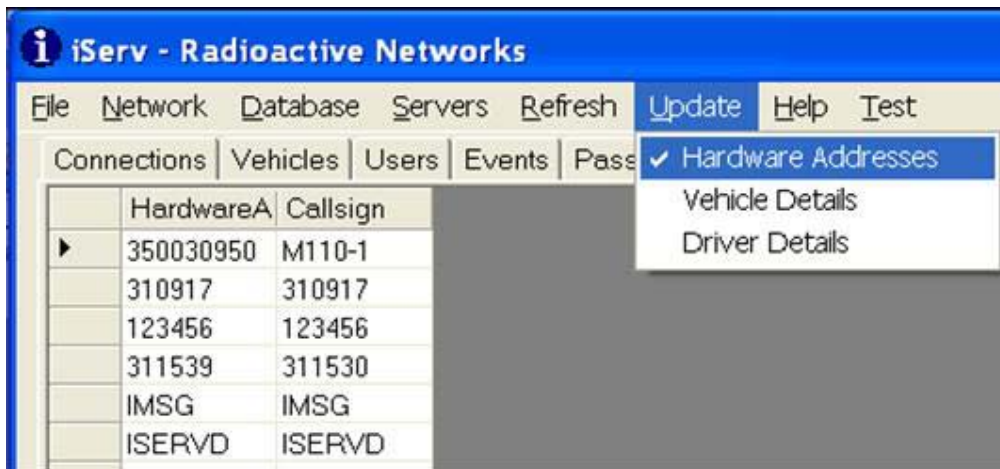
Adding Users and changing PIN numbers

One of the most common tasks inside the database is to Add users, and to change PIN numbers, and the phone access. The fields in the database include

- Driver Number
- Driver Name
- Phone Access Level
- Driver PIN number
- Driver Display Name

The driver number is a unique short number. The Driver Name should be unique, and MUST be identical to the Callsign in the Callsign translation table. The Driver Phone Access Level defines what capabilities the phone has once the user logs in. It is described elsewhere. The PIN number is a series of numbers that must be unique, since it is used as a login ID. The Display Name is the string shown on the screen when the user logs in.

- Start iServ
- Select the Update | Driver Details menu
- Enter Password when asked
- Select the Users TAB in iServ
- Add a new entry as required, ensuring that the cursor leaves the line following the addition
- Select the Update | Driver Details menu once more to save the changes
- Check to make sure that the changes have worked.

Database

Introduction

The database contains information on all th

Database Tables

Table	Description
DriverDetails	
HardwareCallsigns	List of IMEI's
Jobs	List of open Jobs
LatestPositions	List of current positions
MessageMode	Type of message – P2P or to iServ
Messages	List of all messages including Jobs
MessageType	Packet Types list
PhoneMode	Access levels on phone
Positions	List of all positions
VehicleDetails	

Network Architecture

The iServ product suite operates using TCP/IP, Windows File Sharing and Microsoft Access. The exact interface depends on the particular operation being performed.

TCP/IP Ports

A number of TCP/IP ports are used for this application, depending on the type of device connecting to the application. The ports include

Port 5001	iMessage and OziAPRS clients
Port 8001	Net960 and M110
Port 80	NetGPS

Port 5001 for iMessage and OziAPRS Clients

Port 5001 is used for communications between iServ and the iMessage and OziAPRS client software. The iMessage and OziAPRS client software connects to the iServ server on this port in order to exchange messages of various types.

On connecting, iServ sends a series of messages to the client with the last recorded positions of all the mobile stations.

Port 5001 is designed to be used on a high bandwidth link (modem, Ethernet, broadband). Several of the messages could potentially overload a low bandwidth radio link.

Clients connected to port 5001 should see all data sent or received on this port by other clients, as well as all data on port 8001.

Port 8001 for Net960 and M110 units

Port 8001 is designed to operate with GPRS units in the field. Incoming data is massaged into a format that is common to other parts of the iServ system. The incoming data has a Callsign added if it does not have one already.

An important feature of port 8001 is that upon connection, any connections to this port from other clients using the same Callsign are immediately disconnected. This is to remove the possibility of a 'Denial Of Service' attach on this port, from connections to this port without a resulting session.

These type of connections are common on the GPRS network as a way to handle the mobile IP environment.

Port 80 for NetGPS

The iServ software is able to add a small HTTP server on Port 80 for the specific purpose of allowing connections from the NetGPS PC and PDA software. NetGPS allows uploading GPS data in real time from a PDA in the field using the HTTP protocol.

Protocol

The iServ protocol is a modified version of the APRS protocol developed by Bob Bruninga in the USA. The iServ, iMessage and OziAPRS software support most of the position reporting formats in APRS.

Radioactive Networks have extended the APRS protocol to allow highly robust messaging formats, by implementing a sub-class in the User-Defined area of the protocol.

Within this User-Defined area, a number of message types have been defined.

#INCLUDE PROTOCOL DETAILS HERE

iServ Component Interactions
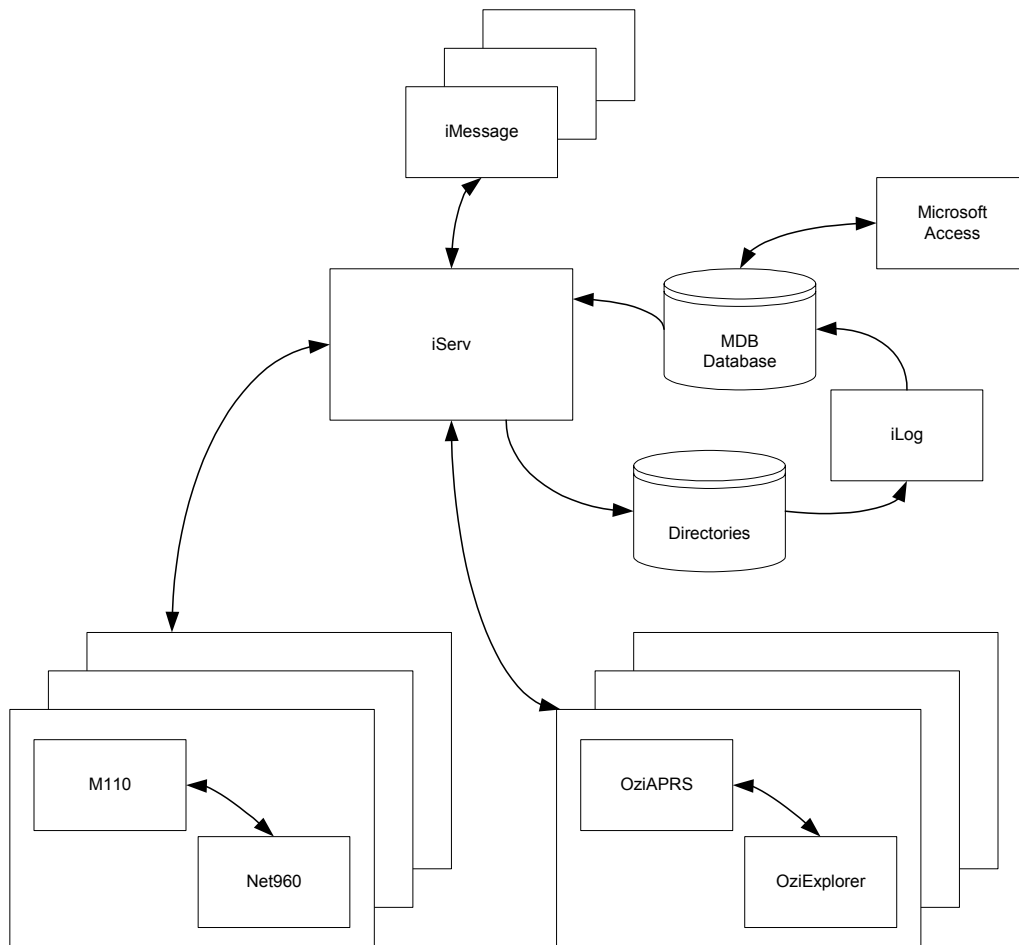
Backups of Data

In an application like this, reliable backups are vitally important. The backups should be done daily or weekly depending on business needs.

Backup of XML Files

The XML files contain the same data that can be found in the database. As such they provide a backup in case the entire database gets corrupted.

1. Shut down iServ
2. Move any files from C:\Program Files\iServ\XML\Errors to C:\Program Files\iServ\XML\Upload
3. Once the files have been processed, close iLog
4. Backup all the files in C:\Program Files\iServ\XML\Done
5. Optionally, ZIP all the files in C:\Program Files\iServ\XML\Done and move them to CD-ROM
6. Optionally, ZIP the files in C:\Program Files\iServ\XML\Errors if there are any and sent them to Radioactive Networks for Analysis
7. Restart iLog and iServ

Backup of Database File

The database file should be backed up periodically to ensure system availability.

1. Shut down iServ and iLog
2. Backup any files in C:\Program Files\iServ\Database
3. Restart iServ and iLog

Startup of PC

1. Start the Internet connection
2. Start iLog from Start Menu
3. Start iServ from Start Menu
4. Start iMessage from Start Menu
5. Start OziExplorer from Start Menu
   a. Load any map required
6. Start OziAPRS from Start Menu
   a. Connect to Server from OziAPRS menu

Something is not working

No vehicle positions are showing up

Is the internet connection running?

PC Application Training

There are a number of areas that need to be trained on the PC Application.
They are

      a) Starting up the software
      b) Using the iMessage application
      c) Using the OziAPRS application
      d) Using the OziExplorer application
      e) Back end reporting (requires Microsoft Access)

Hardware Install

Mercedes Sprinter

9dB Magnetic Cellular antenna

GPS Antenna