ENGAGE GI2 USER MANUAL

Revision v38 March 11

Notice

Revision History

No	Date	Author	Changes	Approved by	Date
3.7	4/05/09	DF	Inclusion of the Revision History	JK	4/05/09
3.8	14/05/09	DF	Minor Spelling Mistakes Corrected	JK	14/05/09
3.9	25/5/09	DF	PSC (UMTS) Clarification Page 20	JK	25/5/09
25.20.3	3/7/09	DF	Revision History Format Changed Bidi And Phone Locator Added Filter Manager Added Target Isolator Added Identities Grid Explanation Added Small Inaccuracies Updated	JK	27/7/09
30.22.02	30/9/09	DF	Major Revision: Spilt of Document into Core and Optional Components Updated Identity Manager Inclusion of Silent Call (GSM & UMTS) Inclusion of Auto SMS Inclusion of Eavesdropper Inclusion of Back Office new features Inclusion of GCR Functionality Matrix Menu Guide Update Modes of Operation (GSM & UMTS) rewritten Addition of Glossary	JK	20/10/09
30.22.02	23/2/2010	DF	Update of Engage Gi2 System Pictures	JK	23/2/2010
34	16/6/2010	DF	Update of: Ranconfig Channelyser ID Manger Context Menu Identities Grid Menu Functionality Matrix License Information Edit SMS on the Fly Alphanumeric SMS DTMF Interception Figure Updates Document Numbering Scheme	JK	16/6/2010
36	1/12/2010	DF	Update of: UMTS Silent Call White / Black List ID Manager Wildcards Target Isolator (Multi Target) Inclusion of: Support for USSD Dynamic Determination of Roles Anonymous Phone Periodic Update of Captured Phones	JK	1/12/2010

38	12/1/2011	DF	Update of: Range Mode UMTS Custom Scan GCR GUI Redesign Call to and Call From Target Addition of Update Tx Button Addition of GPS & Geolocation Addition of Chinese Language Support	JK	12/1/2011

Contents

Figures

1 Hardware Description

1.1 Engage Gi2 System Components

The Engage Gi2 system comprises the following components:

a. Samsonite Attaché case; or
b. Explorer Trolley Case; or
c. Rack Mount system including

Laptop computer
BTS base-station
Battery and power control system
Flat panel antennae
GSM and/or UMTS terminal for base station monitoring (Channelyser)

d. Pocket-PC handheld computer (optional[1])
e. Power amplifier (optional)
f. Power related external accessories including:

Laptop power supply/charger
Battery charger
Direct power supply (desktop power supply)
Pocket-PC battery charger

Figure 1-1.1: Engage Gi2 Multi BTS Version

[1] For a concise list of available options and variations please contact your Agent

1.2 Functional Description

The Engage Gi2 System incorporates a base-station transceiver (RTX) connected to the laptop computer via LAN interface. Communication is carried out through flat panel directional antennas mounted on the top cover of the case.

The laptop runs all control, management and network simulation software required for the operation of the system. The laptop incorporates a built-in wireless LAN module enabling remote operation of the system while the case is closed by using a handheld PDA. The GSM/UMTS terminal allows retrieval of essential network information for easy configuration of the system.

The Engage Gi2 System is powered by two separate power sources. The laptop is powered by its internal battery; the RTX and GSM/UMTS terminal operate on a dedicated battery located on the top cover inside the case lid.

The Engage Gi2 System comes in many different forms, all made to order.

‘A: GSM Band Only, Single BTS with a Convertor. i.e. two Bands mounted within Samsonite Attaché case

3’D: GSM & UMTS, Single BTS with a Convertor and a Single Node-B mounted with in Samsonite Attaché case

‘M: GSM Only Multiple BTS (no Convertors) mounted within Explorer Tactical Case

’M: GSM & UMTS, Multiple GSM BTS and/or Multiple Node-B mounted within a Explorer Tactical Case

3’R GSM & UMTS Multiple GSM BTS and/or Multiple Node-B in Rack Form

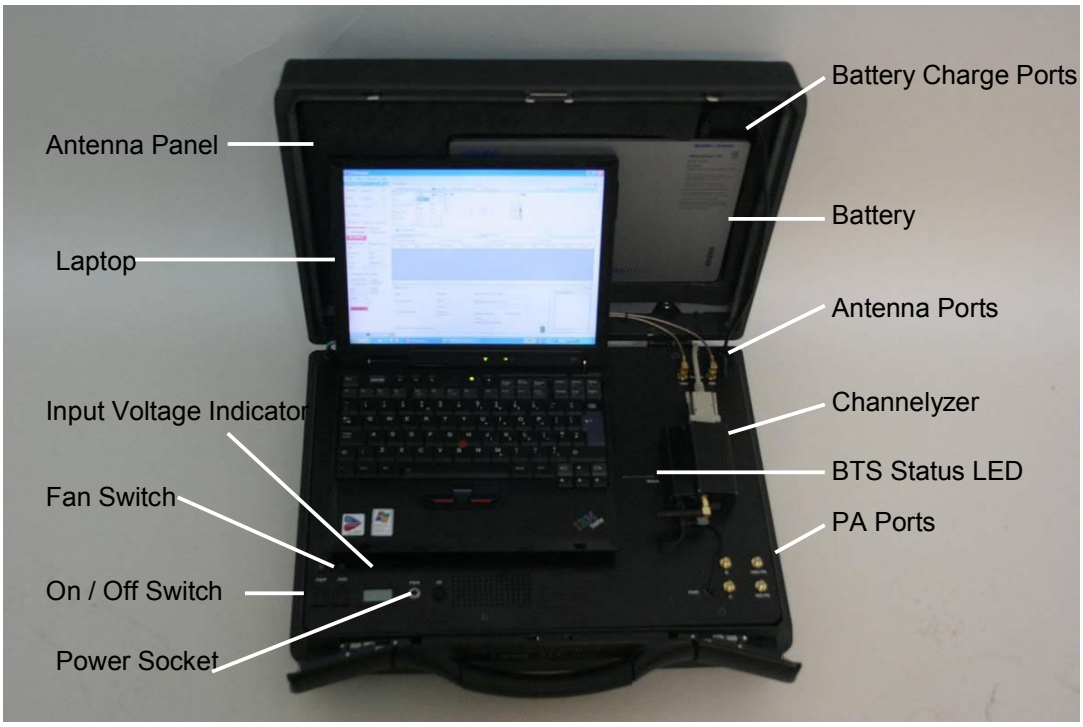


Figure 1-2.1: ‘A’ System, Open Attaché Case View

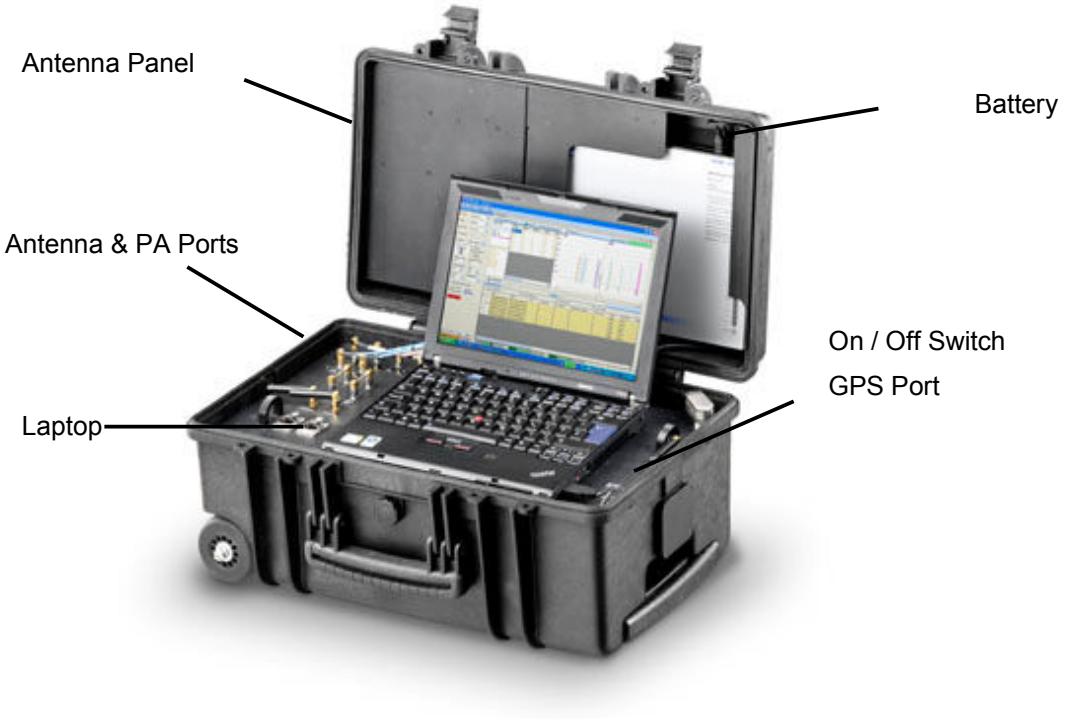


Figure 1-2.2: 'M System, Open View

1.3 Power Management

The Engage Gi2 System is designed for two main modes of operation:

a. Static operation where mains power (110/220 vAC) is available
b. Static viechle operation where 12vDC is avialble
c. Battery power during portable or covert operation

During static operation, plug the DC connector of the Engage Gi2 System (desktop) power supply into the power (PS) socket. Once plugged, the power indicator will light. While the Engage Gi2 System power supply is connected.

Connect the laptop charger/power supply to ensure that the laptop's battery remains fully charged.

To charge the System battery, plug the Engage Gi2 System battery charger into the System battery charge socket. You may charge the Engage Gi2 System battery while it is operating on the external power supply. However, when the system is transmitting, do not connect or disconnect the power supply plug or the AC voltage supply thereof.

Note, the 3'D & 'D Models' Batteries take charge directly from the Unit and no additional charging is required. i.e. The Battery is charged via the 'D unit and NOT directly.

The Engage Gi2 System battery operation may take place when the case is closed and all power supplies and chargers are disconnected. When operating the unit, periodically monitor the status of both the laptop's battery and the System battery. You may monitor the laptop's battery status via the PDA. To monitor the Engage

Gi2 System battery status, open the case and check the current voltage reading of the battery meter or press the battery indicator button to see the battery charge status in percentage.

When fully charged, the System battery should allow RTX operation for at least two hours.

To ensure proper operation of the system while the laptop display is closed, click the following sequence: Start => Settings => Control Panel => Power Options and in the Power Schemes tab, switch all settings to 'Never'.

1.4 Heat Dissipation

The Engage Gi2 System internal power amplifier generates heat in the electronic enclosure underneath the base plate.

Al units have cooling fans. Care should be taken not to cover the air intake or outlet during operation. Engage Gi2 Software Configuration

1.5 Operating System

a. The Manager & Backoffice runs on the Windows Operating System.
b. Minimum Requirements are:
c. Windows XP Professional with Service Pack 3
d. Microsoft .Net Framework 2.0 or 3.5

1.6 Licensing

The Engage Gi2 System is a modular and allows the user to customise which of the software components is available to them.

The components that a user can access are controlled through Licensing. It is understood that a users requirements upon delivery or over time may change. If this is the case please contact your Agent for details of what software is available / compatible and how to upgrade your current system.

Figure 2-2: Help-About License

Throughout this User Manual the software / hardware modules that are optional (some of which you may have taken) are marked with (Opt.).

1.7 RAN Configuration

For software versions 25.20 and above several setting configuration changes are made through a tool call “RAN Configuration Tool”.

Note: RANCONFIG is only to be modified under the supervision of the Training and Support Engineers as the incorect value could cause damage to the system

1.8 Network IP Configuration

The laptop IP Configuration should not be modified. Doing so can cause your system to stop working.

Note: any connection to the internet should be made via WiFi and not using the Ethernet Adapter.

2 Engage Gi2 System Operation

2.1 Starting the Manager Application

To start the Manager, double-click the Icon on the desktop.

The Manager screen will appear, the appearance will vary according to your individual Unit's Configuration.

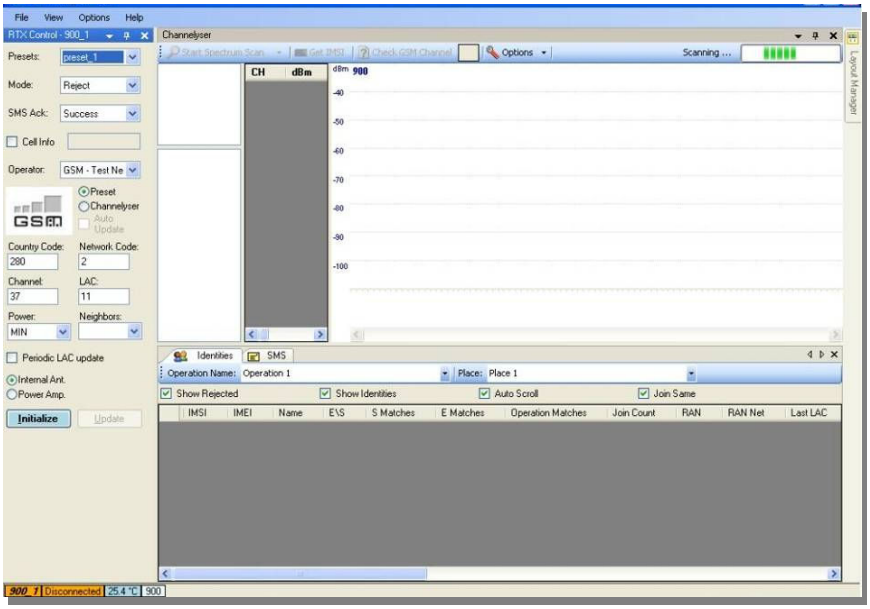


Figure 2-1.1: Manager Screen

2.2 Layout Manager

In order to take advantage of the dynamic GUI, it is possible to load and save different layouts so as to customise how you wish the Engage Gi2 System to look.

Six different default layouts are configured in advance:

- Interrogation
- Channelyser
- Silent Call
- PDA
- Call Router
- Scheduler

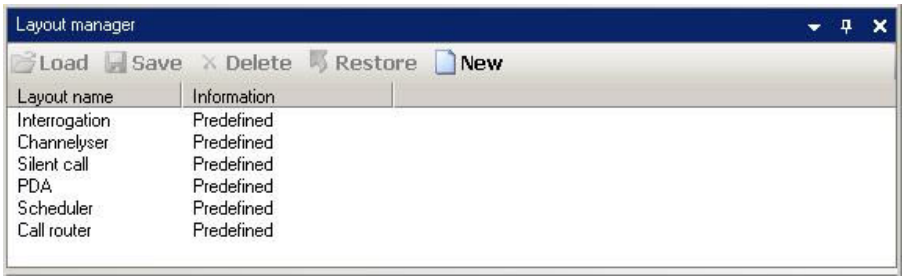


Figure 2-2.1: Layout Manager

Save: allows the user to save a desired GUI configuration

Load: loads the selected layout

Delete: deletes the selected layout

2.3 Channelyser

The Channelyser option integrates the System with a multi-band (GSM and/or UMTS) terminal, capable of monitoring the received signal strength of the surrounding network/s detected. The Channelyser user interface presents the user with all the information essential for configuration of the Engage Gi2 System. The information is presented both in textual form as well as a graphical representation of the Broadcast Control Channels.

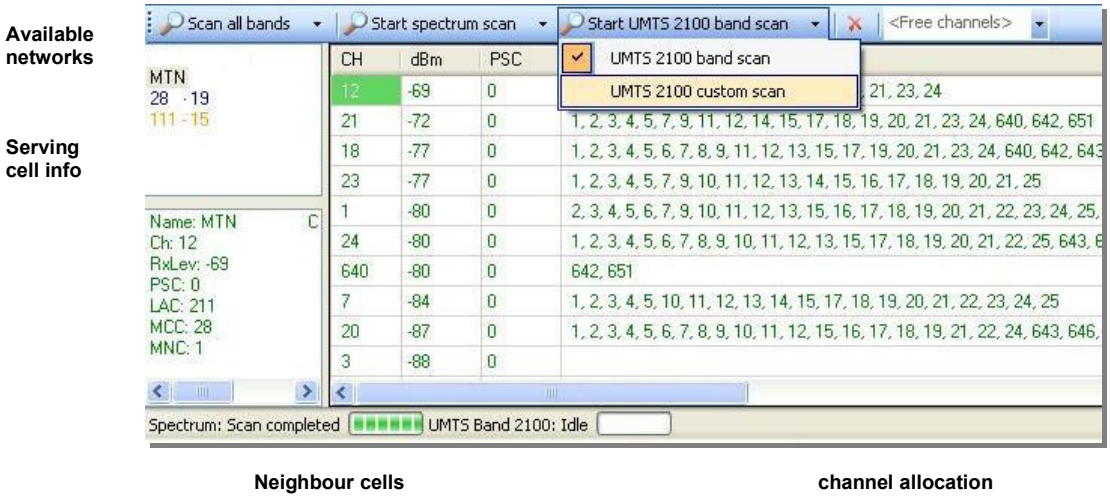


Figure 2-3.1: Channelyser User Interface

a. **Available networks**: contains the names of the Networks received upon running a Scan

b. **Neighbour cells info**: contains channel (ARFCN) numbers of serving cell and several neighbour cells, each with their respective received signal strength (in dBm), Location Area Code, Cell Identity and C1, C2 properties. [2]

c. **The graphical representation** of the received BCCH channels displays the channel strength and the channel number. The channels belonging to each network operator appear in the same colour as in the network operators list. In order to increase channels visibility, it is possible to enlarge an area of the band by simply selecting it. A right-click, Unzoom option will display the whole band agian.

d. The type of scan selected will remain the default one until another selection is made.

Scan all bands performs complete RF scanning of all available (GSM & UMTS) channels that the system supports and displays the frequency utilization.

[2] C1 and C2 parameters are available on GSM operator scan mode only

Custom Scan all performs complete GSM scan of all available Channels, that the system supports, and UMTS channels that have been found in any previous scan, **then** displays the frequency utilization.

GSM - Spectrum Scan (Full scan) performs complete RF scanning of all Channels configured on your particular System[3].

In case the Channelyser is not properly connected / or not connected at all, an error message will pop up “Unable to connect to Channelyser”.

GSM - Continuous Scan monitors a certain operator and displays dynamically the network changes of the serving cell and its list of neighbours.

UMTS- Band scan performs complete RF scanning of all UMTS channels and displays the frequency utilization

UMTS- Custom scan performs complete RF scanning of all UMTS channels that have been found in ANY previous Scan. These can be selected as required in order to reduce the time of the scan.

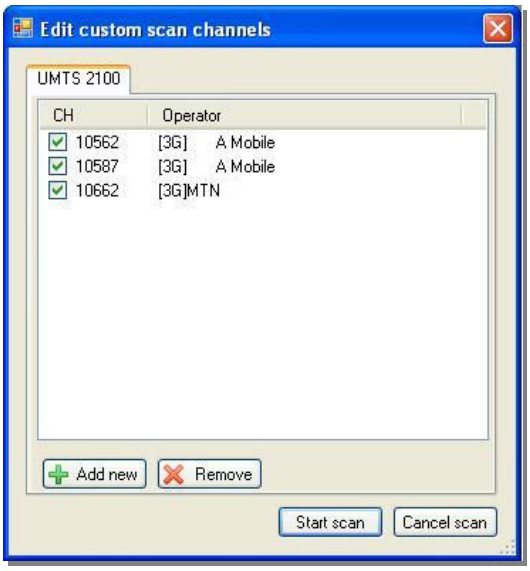


Figure 2-3.2: UMTS Custom Scan pop-up dialogue box

Upon starting of the Channelyser, the module scans for all available GSM/UMTS networks in the area. All networks are presented in the leftmost area.

a. The Channelyser uses the network information retrieved during the scan to suggest possible RTX configuration parameters for BA List mode interrogation. The suggested configuration is automatically populated into the network drop-down box in the RTX Control area.

[3] For a concise list of available options and variations please contact your Agent

b. By clicking the Channelyser button in the RTX Control area, the user may select Channelyser suggested configuration for each of the networks previously scanned by the Channelyser. Once selecting a Channelyser suggested configuration, the user may manually override the settings by changing the value(s) in the respective text box and clicking the Update button.

The Channelyser Tools menu enables the following options:

c. **Free Channels:** checks the RF activity over the specified GSM/UMTS channel. Channels with measured RF activity below -100 dBm are reported as free by being displayed Green. Red means the channel is in use.

d. **Load to Ran:** Adds Free channels to the Neighbours List of that particular RAN. This is used primarily for GSM Silent Call.

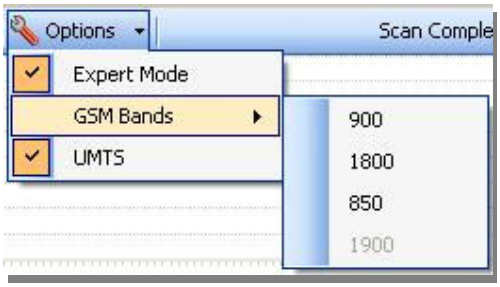


Figure 2-3.3: Options Drop down menu

e. **Expert Mode:** is affecting Operator Scan and Continuous scan. When selected, the action will return the usual results, plus additional information for the cells in the list, like BA list or Status. Not all the cells will return full information when interrogated.

f. **GSM Bands:** offers the ability of selecting which band should be visible in the graphical representation of the Channelyser.

g. **UMTS:** offers the ability to view \ hide UMTS band

2.4 RTX Control (Configuring Network Presets)

RTX Control is the area where the user defines the transmission parameters that will be sent to the BTS. Currently, the Manager supports single and multiple BTS kits. For each BTS owned, the user will be allowed to set the presets parameters by selecting View->RTX Control-> desired BTS or by selecting the tab at the bottom left of the Manager.

There are two types of BTS:

1. GSM
2. UMTS - 3G

The interfaces of these two types are different, due to the different network properties.

There are two modes of operating:

I. Manual selection

II. Channelyser selection

Manageable by selecting Preset radio button, or Channelyser radio button on the RTX Control form.

I. Manual selection allows the user full control over the transmission parameters, either by selecting an already existing preset from the Presets drop down list, or by entering all the details by hand and start transmitting.

II. Channelyser mode will automatically populate the parameters according to the internal selection rules of the channels returned by Channelyser scan.

Note: It is possible to populate the RAN by right clicking on the any of the Channelyser's results' fields and selecting 'Update'.

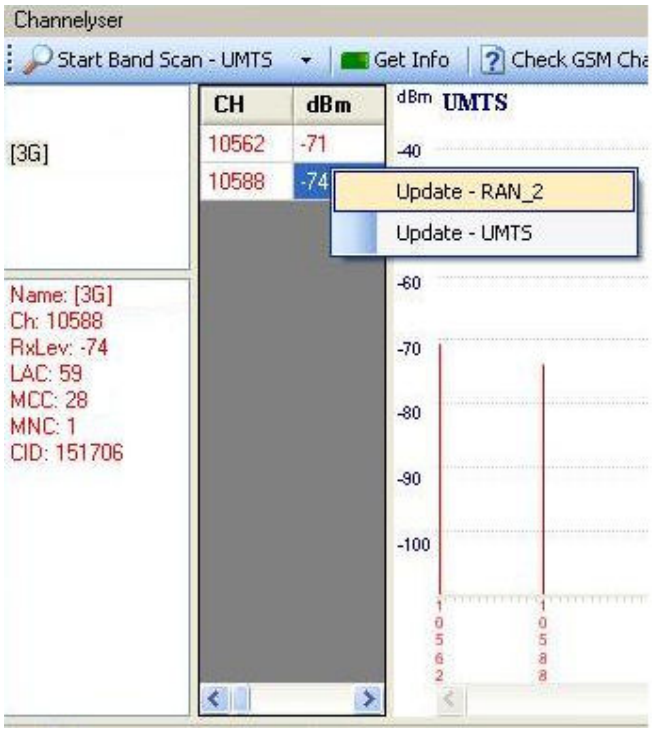


Figure 2-4: Channelyser Applying Presets

2.4.1 GSM RTX Control

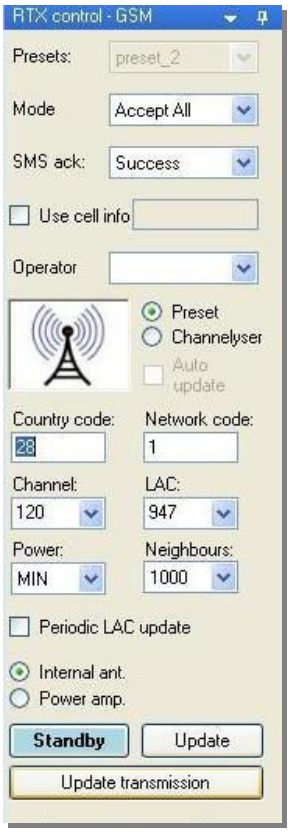
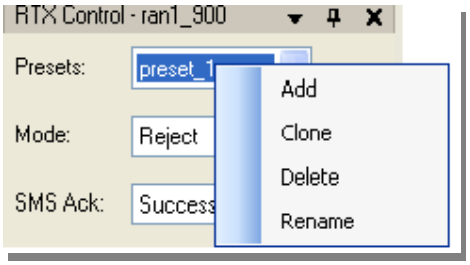


Figure 2-4.1: Preset configuration

Presets: The name you enter is for management and user interfaces purposes only and will not be transmitted to the mobile phones connected to the Engage Gi2 System. The name displayed on the mobile phone screen is a function of the Country Code and Network Code only.

By using the right-click operation, a context menu is displayed and the user is able to operate on the presets list:



Add: Adds a new preset to the list

Clone: Clones the currently existing preset, under another name

Delete: Deletes currently selected preset from the list

Rename: Renames the currently selected preset

The context menu is disabled while transmitting or if you work in Channelyser mode.

Mode: Accept or Reject mode of transmitting. (See Section 2.5.3)

SMS Ack: SMS "Acknowledgement" mode:

- Fail – notifies the sender that sending the SMS failed regardless of the real result.
- Success - notifies the sender that sending the SMS succeeded regardless of the real result.

Operator: Select Operator.

Country Code: Enter the 3-digit Mobile Country Code (MCC) of the network you wish to operate. This box will be filled automatically when choosing an Operator (1)

Network Code: Enter the Mobile Network Code (MNC) of the network you wish to operate. This box will be filled automatically when choosing an Operator (1)

Channel: Enter the channel number or Absolute Radio Frequency Number (ARFCN) allocated to the present network.

Location Area: Enter the Location Area Code (LAC) you wish to transmit. Make certain that the value you select is different than the value currently used by the actual mobile network active in the area where the System is operated.
In the event that you have previously used the Engage Gi2 System in Reject mode on the present network, you must select a different location area code than the one previously used.

Power: Select the desired transmit power. The power is varying between Maximum power and Minimum power in -2db steps.

Neighbours: To set the adjacent cells transmitted by the Engage Gi2 System write the ARFCN in the box, right click and choose "Add To List". To remove a specific Neighbour choose its ARFCN, right click and choose "Remove From List". It is possible to choose up to 32 neighbour cells for each RTX control.

Output port: select the output port to be used by the Engage Gi2 System. When transmitting via the unit's internal antennas select "Internal Antenna" and while using an external power amplifier, select "Power Amp".

Auto Update: If selected, when the user clicks Transmit button, the System will run an Operator Scan (against the operator selected in the preset) and update the ARFCN and LAC. The System will automatically start transmission after the scan has finished.

Update: When selected the transmission and the Preset are both updated.

Update Transmission: When selected only the transmission is updated. i.e. not the Preset.

Note: the parameters listed above can be altered on-the fly, i.e. while transmitting, by using the Update button for the change to take effect.

Also, note that once a preset has been updated the preset is 'saved' in this configuration. Therefore, when restarting Manager the latest saved Config is used. This remains true for Scheduled Tasks as well, the preset last saved prior to the execution of the Schedule is used.

2.4.2 UMTS RTX Control (Opt.)

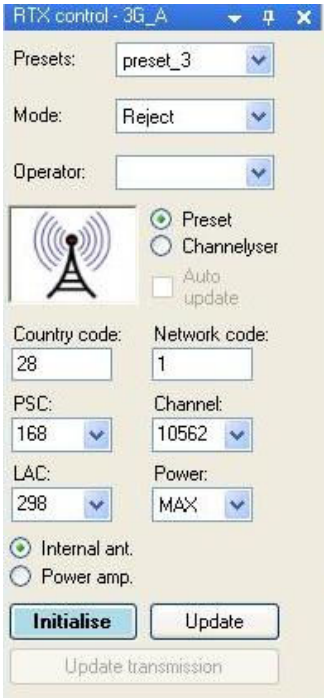


Figure 2-4.2: UMTS RTX Control

Presets: [Refer to GSM RTX Control - Presets]

Operator: [Refer to GSM RTX Control - Operator]

Country Code: [Refer to GSM RTX Control - Country Code]

Network code: [Refer to GSM RTX Control - Network code]

LAC (Location Area Code]: [Refer to GSM RTX Control - LAC]

Channel: Enter the UMTS channel number (Use the Channelyser results)

PSC (Primary Synchronisation Code): Scrambling codes are used to identify cells (sectors). Each cell is assigned a unique primary scrambling code – between 0-511.

Standby \ Transmit: Start \ Stop transmit

Update: Updates the Transmission on the fly and updates the Preset.

UpdateTransmission: Updates the Transmission on the fly and does NOT update the Preset.

2.4.3 BTS LED Status Indicator (Where Available)

GSM BTS' have an LED that indicates its status. The LED can be seen through the slot cut into the top plate of the Engage Gi2 System.

Flashing Red – Powered Only

Flashing Green – Initialised but not Transmitting

Continuous Green – The BTS is Transmitting

Note: UMTS Node-Bs do not have an LED Indicator

2.5 Engage Gi2 Interrogation

2.5.1 Start Interrogation

a. Switch ON one, or more of the connected RTX Hardware.
b. Start the Manager application.
c. After starting the application, the default presets will be selected and ready to use on all RTX Control panels. However, the user can select different preset from the drop-down box and also manually change the presets or add new ones.
d. Select the required operation mode from the "Mode" drop down box in the RTX control window.
e. Verify "Show Rejected", "Show Identities" and "Join same": are checked in the "Identities" window.
f. Click the Initialize button in the RTX controls you wish to transmit on, to start the network simulator and establish the required connections with the RTX hardware.

Within a few seconds you may notice that the GSM Network Simulator icon appears and the Manager waits for the establishment of a connection from the RTX hardware, as follows:

Observe the status bar and the messages on the bottom of the Manager window.

The first status message should indicate: "Network Started".

A few second after the following message will appear “RTX Initializing”.

After initialization is complete, the RTX switches to the Ready state and the "Standby (Ready for operation)" will be displayed, and the Standby button will change to Transmit.

Click the Transmit button in order to start interrogation sequences on all the RTX controls you want to capture.

The System status bar will now indicate “RTX ON” and handsets subscribed to the selected networks will start registering.
Each handset that registers will include a line within the "Identities" window table..

It is possible to change the "Channel" property while transmitting. After changing the channel, click the "Update" button.

2.5.2 Stop Interrogation

It is possible to stop, one by one, all running transmissions. However, you can only stop some of the running simulations and leave the others operating.

a. To stop transmission, select desired RTX Control and click the Standby button
b. Once the Standby button is clicked, interrogation is disabled and the RTX hardware is switched to the Standby state.
c. You may now resume transmission by clicking the Transmit button again or switch to another network by clicking the Network drop-down box and\or changing each network properties.

2.5.3 Interrogation Modes

The Engage Gi2 System supports different Modes of interrogation. Although here are some commonalities between the Modes in GSM and UMTS it is easier to think of each of them as distinct and separate. The different features and functions are detailed below.

2.5.3.1 GSM & UMTS Modes of Operation

GSM - Reject Mode

When interrogating in Reject mode, the Engage Gi2 System rejects all registration attempts of unknown GSM handsets after collecting their IMSI, IMEI and other data. The Handsets will re-register with an available Commercial Network.

GSM - Accept All Mode

When interrogating in Accept mode, the Engage Gi2 System accepts the registration attempts of all GSM handsets within range of the Network. Once accepted to the System network, a temporary local phone number (MSISDN) is allocated, for the present session only. One registered handsets may call another one by dialling any automatically assigned temporary number. (Private Network)

Note: Once rejected, a given handset shall typically not attempt to register again with the System unless the location area code is modified.

GSM - Accept – short range

When interrogating in ‘Accept – short-range’, the Engage Gi2 System accepts the registration attempts of all GSM handsets up to 100 meters. Just as with ‘Accept All’ Once accepted to the System network, a temporary local phone number (MSISDN) is allocated, for the present session only.

Phones out of range will be rejected and NOT be displayed and NOT stored in the database. This includes phones in any of the Lists, (White or Black).

GSM - Accept – mid-range

When interrogating in ‘Accept – mid-range’, the Engage Gi2 System accepts the registration attempts of all GSM handsets up to 550 meters. Just as with ‘Accept All’ Once accepted to the System network, a temporary local phone number (MSISDN) is allocated, for the present session only.

As with ‘Accept short range’, Phones out of range will be rejected and NOT be displayed and NOT stored in the database. This includes phones in any of the Lists, (White or Black).

GSM – Denial of Service (DoS)

When interrogation in DoS Mode the Engage Gi2 System first collects the IMSI, IMEI etc then rejects the handset. The Handset will NOT re-register back to the commercial network until it is powered off and on again. (Hard Reject)

Note: Use with Extreme Caution.

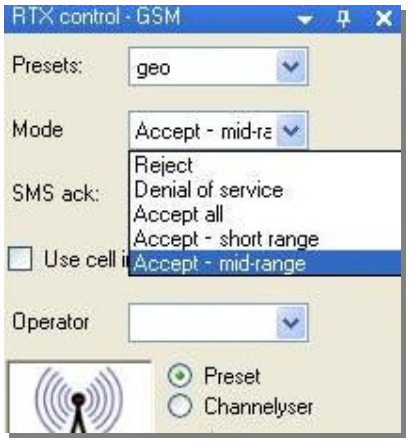


Figure 2-5.3.1: GSM Modes

UMTS – Reject Mode

Handset information is gathered. i.e. IMSI, IMEI, distance approximation, then the Handset is return to the commercial UMTS network.

Note: In order to cause the Handset to re-register to the System both the LAC and PSC must be changed.

UMTS – Blocking Mode

(Parallels can be drawn with the GSM 'Accept Mode'.)

All Handsets camp on the System, they do not have commercial network access. As each Handset performs its Location Update they appear White in the Identities Grid.

UMTS – Denial of Service (DoS)

Handset information is gathered. i.e. IMSI, IMEI, distance approximation, then the Handset is Hard Rejected. It must be powered off then on again before it will re-register with any network.

Note: Unlike GSM this is currently for ALL phones – this cannot be performed on a selected Handset like GSM, but is valid for Dual Mode phones as well. In addition, roaming phones may register to a different network.

UMTS – Move to GSM

Handset information is gathered. i.e. IMSI, IMEI, distance approximation, then a single Handset can be told to register to the GSM channel on which the System is Transmitting, thus allowing for further manipulation.

UMTS – Move All to GSM

Handset information is gathered. i.e. IMSI, IMEI, distance approximation, then all Handsets are instructed to register to the GSM channel on which the Engage Gi2 System is Transmitting.

Note1: UMTS only phones return to the commercial network at the end of the System Transmission.

2.5.4 Data Management

All interrogation sessions are recorded in a MySQL Database for retrieval and data analysis.

To make it easier to extrapolate the data collected by the System, it is crucial that the Operation Name and Place Name be given.

Note that all session information is logged upon clicking “Standby”. The user needs to manually advance the session number according to the operational scenario.

2.5.5 Closing the Application

Ensure all transmission have been stopped and click the top-right close icon on the Manager to close the application. The Manager Application window closes and so does the GSM Network Simulator icon. The RTX hardware’s status indicator light (applicable to some ‘A’ units only) may briefly switch to red colour and then switch to orange colour. It is now safe to switch OFF the RTX hardware.

2.5.6 PDA Operation

Once a VNC connection is established between the handheld PDA and the laptop (refer to Section 5.3), switch to "PDA" layout in the "Layout Manager" window.

Once started, the user interface and operational sequence is quite similar to the operation from the laptop console. However, several points should be noticed:

a. Response time through the VNC link is slower than laptop console operation.
b. PDA display size required scrolling in order to view all data received.
c. Use the virtual keyboard to enter text into text boxes.

2.6 Identities

This window will show all the different identities captured by the Engage Gi2 System and all their relevant parameters.

The accepted identities have a white background, while the rejected ones have an orange one, thus making it easy to distinguish the suspects from the regular identities. If a special entry, as defined in Identity Manager, is captured by Engage Gi2 System, the entry in the Identities display will have the colour as defined by the user to make it even more prominent. The SMS grid and Back Office records are also coloured according to the Identity Manager.

Once the interrogation has been stopped, all the captured IDs will be filled with dark orange colour in order to separate between previous and current interrogations.

If an entry is greyed out, means that the mobile station did not receive a response last time it was paged which could indicate the mobile moved out of range or was turned off (IMSI Detach).

2.6.1 Anonymous Phone Protection

This feature allows the user to specify whether the data of phones NOT in the Identity Manager is displayed and stored.

If 'Protect Anonymous' is ON then all captured information of handsets NOT in the Identity Manager is discarded.

Note: this is not dependant on whether a defined Identity is in the White or Blacklist.

Protect Anonymous is set under the 'Settings' tab.

1. When the option is <u>turned off</u>, the following applies:
    a. All anonymous phones are displayed in Identities grid
    b. All anonymous phones data is saved to the database
2. When the option is <u>turned on</u>, the following applies:
    a. No anonymous phones are displayed in Identities grid
    b. No anonymous phones data is saved to the database

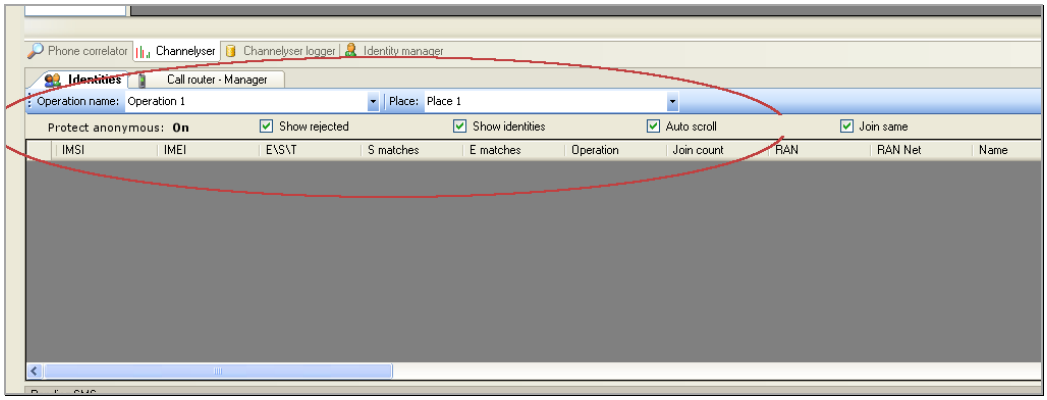


Figure 2-6.1: Identities Grid – Protect Anonymous

2.6.2 Periodic Update of Captured Phones

The Identities Grid shows which phones are stil currently registered to the Engage Gi2 System by performing a periodic Update. This applies for the first ten phones to be captured that have entries in the ID Manager.

2.6.3 Identities Grid Menu

By right clicking on any captured Identity the following Menu is displayed.

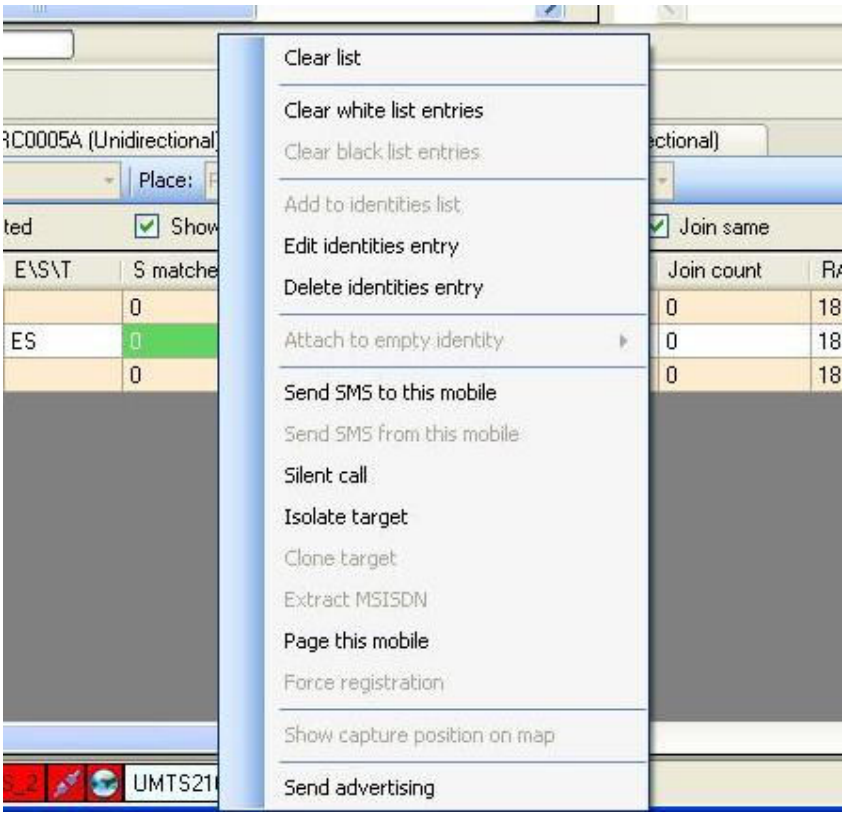


Figure 2-6.3.1: Identities Grid – Right Click Options

Clear List: Removes the current captured handsets from the display. Note, handsets are not deleted from the historical database. This can only be done through the Back Office.

Add/Edit/Delete White List Entry: Allows the user to access the White List entry directly from the Identities Grid. (See later Section for Functional Description)

Add/Edit/Clear Black List Entry: Allows the user to access the Black List entry directly from the Identities Grid. (See later Section for Functional Description)

Add/Edit/Delete Identities Entry: Allows the user to access the Identity Manager directly from the Identities Grid. (See later Section for Functional Description)

Attach to empty identity: Allows the user to add the captured IMEI and IMSI to a previously created Identity.

Send SMS to this Mobile: Allows the user to send an SMS to a Captured Identity. The SMS can be sent with up to 700 Characters and the Senders number can be specified. Note, this must be Licensed.

Send SMS from this Mobile: Allows the user to send an SMS from Captured Identity. The Captured Target must be able to be Cloned. The SMS can be sent with up to 700 Characters and will appear to be sent from the Cloned phone's number. Note, this must be Licensed.

Silent Call: User can initiate a Silent Call Directly from the Identities Grid. Please see Silent Call section for further description. Note, this must be Licensed.

Isolate Target: User can Isolate a Target Directly from the Identities. This removes the User from the Commercial Network by adding them to the White List, changing the LAC and placing them on a Clear Channel. The Clear Channel is defined by the user by adding it to the Neighbour Cells field in the RTX Control Window. Note, this must be Licensed.

Clone Target / Dedicate Router: This Function becomes available with a GCR. For a Captured Identity the options Clone Target (Bidi) or Dedicate Router (Uni) are available. See the GCRs section for detailed description. Note, this must be Licensed.

Extract MSISDN: Allows the user to determine the Captured Target's MSISDN. A USB Sim reader is required. Note, this must be Licensed.

Page this mobile: After a target is initially captured by the System it is possible to check whether it is still being held. Paging the target shows the 3 measurements, all three are the Downlink power readings. i.e. the signal strength that the handset receives the System at.

Force Registration: This is a quick way to cause a handset to register with the System. This adds the Handset to the White List and automatically changes the LAC, thus causing the handset to re-register with the System.

Show Capture Position on map: This function shows the location of the system when the Target was captured. This functionality works using 3rd party mapping software that must be configured to read and write data to the mapping com ports of the unit.

Send Advertising: Allows the user to send an Audio File to the target thus initiating a Call for the purposes of Eavesdropping. See Eavesdropper Section. Note, this must be Licensed.

NOTE: The availability of the above options depends on the status of Target. i.e. the mode you are transmitting in (Accept or Reject), what Ciphering the handset uses, Licensing etc.

By right clicking on any column header, a context menu pops up allowing the user to select only the information he wants to display. This configuration will be saved and loaded next time the user opens the application.

It is possible to change the columns order for a more convenient use, just drag and drop.

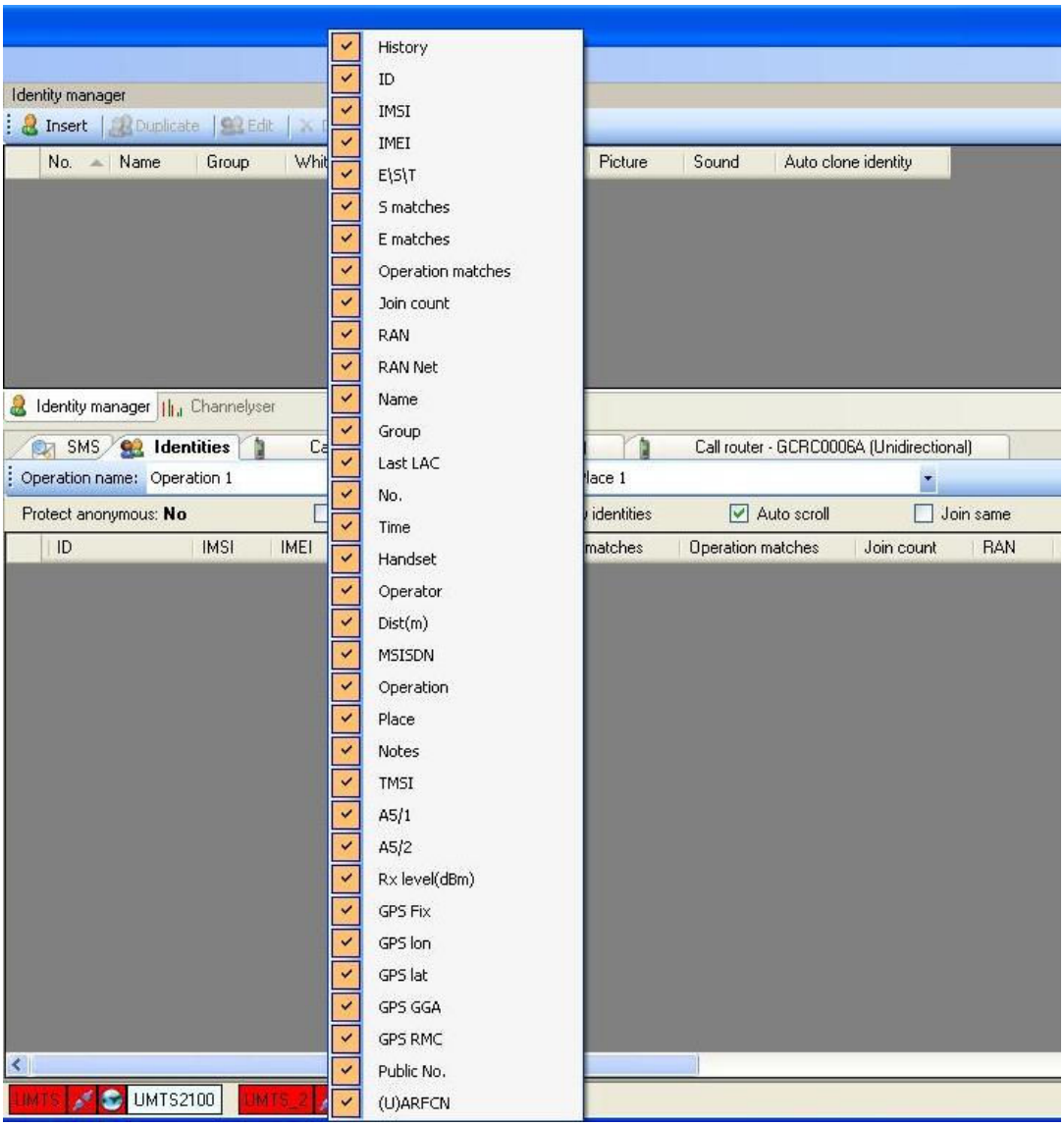


Figure 2-6.3.2: Identities Grid – Field Explanation

History: The '+/-' (expand/collapse icon in the left side of the entry) allows the user to visualize the history of that handset. Currently, the Engage Gi2 System keeps the history of the last 10 times a specific device was captured.

ID: Not Implemented Yet

IMSI: the phone's International Mobile Subscriber Identity (IMSI) of the SIM card within the interrogated handset.

IMEI: The International Mobile Entity Identity (IMEI) representing the handset's manufacturer serial number.

E\S\T: refers to Equipment\SIM match and displays

- E\S if the identity was captured in 2 different places of the same operation at least 2 times with the same SIM in the same Mobile Station.

- E\S if the identity is defined in the Identity Manager with the exact combination of IMSI\IMEI, regardless of operation and places it is seen.
- E if the identity was captured in 2 different places of the same operation at least 2 times with the same Mobile Station, but different SIM card.
- S if the identity was captured in 2 different places of the same operation at least 2 times with the same SIM card, but different Mobile Station.
- T (TMSI Match) only used for Phone Correlator
- Blank if none of the above.

S Matches: indicates how many times the user has been captured with its last saved IMSI.

E Matches: indicates how many times the user has been captured with its last saved device (Equipment).

Operation Matches: indicates how many times the target was captured in this particular Operation and Place.

Join Count: is operational after Join Same checkbox has been checked, it counts the number of occurrences joined together. You will see only one entry for a specific IMSI/IMEI combination and a number displaying how many times, during the same transmission, the System has seen it. This is valid when the 'Place' has been changed before Transmitting.

RAN: specifies the RAN on which the target was captured on.

RAN Net: the current transmission MCC + MNC the target was captured with.

Name: displays the name under which the identity is registered in Identity Manager, blank otherwise.

Group: The type of Identity this Handset belongs to.

Last LAC: shows the previous LAC the phone was registered to. It can display a real network LAC or previously simulated System LAC.
[Not applicable for UMTS].

No.: counts the identities captured in the same session.

Time: the exact time (HH:MM:SS AM/PM) of each mobile phone registration.

Handset: the manufacturer and phone model of the captured phone, based on the IMEI's Type Approval Code (TAC)

Operator: the captured SIM's network operator, based on the SIM's actual MCC/MNC

Distance: gives the distance range within which the handset is likely to be found. Minimum and Maximum distance is shown.

MSISDN: displays the MSISDN of an accepted phone if entered in the ID Manager. If the Handset does not have an entry , a system generated one will be attached, starting from 1000 and incrementing with 1 each time a new device is accepted. If the device is rejected, the System will not attach it an MSISDN.
[Not applicable for UMTS]

Operation and **Place**: The project label assigned to the specific activity. While expanding the History list, these columns may display different operations and places where this identity has been seen.

Notes: displays the notes (if any) defined for the target in the Identity Manager, blank otherwise.

TMSI: the registered users original (initial) TMSI.

A5/1: Indicating whether or not the captured phone support A5/1 algorithm [Not applicable for UMTS]

A5/2: Indicating whether or not the captured phone support A5/2 algorithm [Not applicable for UMTS]

RX Lev: the signal strength measurement of the phone's signal

GPS Data: See Section GPS & Geolocation **Public No**.: Displays the Public Number (if any) as entered in the ID Manager

Status: Indicates whether a Handset has been 'Isolated' (See Isolate Targets)

(U)ARFCN: Displays the Channel on which the identity was captured.

2.7 Identity Manager

The Identity manager enables the user to define "Special identities" such as team members or targets.

You can set extra information for specific identities, such as name, sound alert, colour, picture, SMS notification and notes.

Every captured phone that will match an identity in this list will trigger a visual alert holding the photo and the extra text information, an audio alert (the sound defined in Sound field) and an SMS alert to the number provided in the specific field.

Figure 2-7: Identity manager

2.7.1 Insert new identity

There are 2 options to insert new identity:

Open the identity manager and press the "**Insert**" button – the "Identity Properties" window will open.

Right click on a captured phone and select "**Add to Identities List**" The identity edit window will be opened with the selected phone's IMSI and IMEI and ready to be edited/filled.

Note that adding a MS using the "**Add to Identities List**" function populates some of the fields for you, therefore, it is recommended to use this option if possible.

2.7.2 Edit identity

Handset Tab

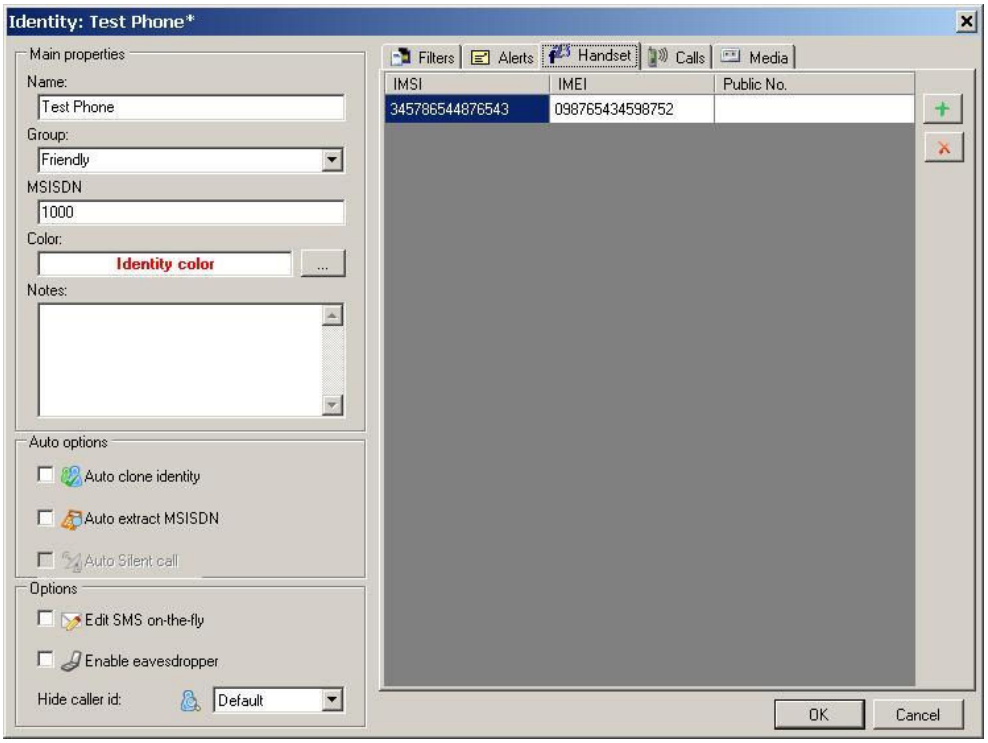


Figure 2-7.2: Identity Manager – Handset Tab

Name – Set a new identity name or select one of existing names to add another IMSI/IMEI to the same identity.

Group – Set the type of Identity this Handset belongs to. New groups can be created and then become available in the drop down menu of each Identity.

MSISDN: System assigned MSISDN. Can be modified by the User.

Colour – Set a colour to appear whenever said identity is displayed.

Notes – Add note to be attached to the identity.

Auto Clone Identity – if the Target is captured and a GCR available then this Identity will be automatically Cloned by the system.

Auto Extract MSISDN – if the Target is Captured and a BiDi is available then the Targets real MSISDN will be extracted. Additionally the MSIDN will be added to the identity where both IMSI & IMEI match in the phone number (public network) field. If no match is found then a new identity will be created (License Dependent) Note: IMSI must be defined for this option to be available.

Auto Silent Call – when selected and a Target Captured the System will automatically start the Silent Call.

Edit SMS on-the-fly: When selected any Incoming or Outgoing SMS's will appear in a pop-up box giving the user the option to Edit or Block the SMS.

Enable Eavesdropper – (Eavesdropper Application Only) if the Target is Cloned (and makes a call) or Advertising sent then the Eavesdropper function is initiated. See Eavesdropper section for full

description. (License Dependent). Global setting for ANY calls for this Target.

IMSI – Set\Edit IMSI. User may provide full or partial IMSI number.

% represents multiple missing digits

_ represents a single missing digit (total must = 15)

IMEI – Set\Edit IMEI. User may provide full IMEI number.

% represents multiple missing digits

_ represents a single missing digit (total must = 15)

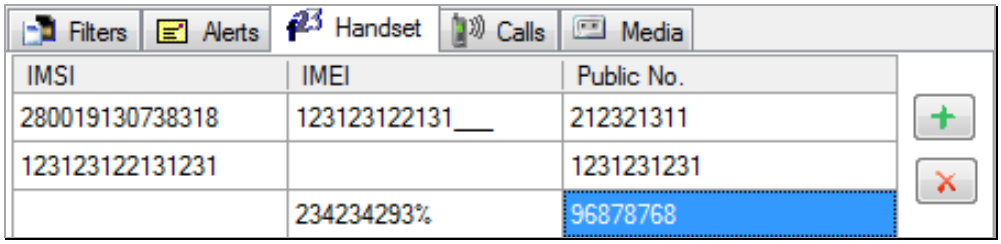


Figure 2-7.3: Identity Manager – Using Wildcards

Public No. - If the 'Real' MSISDN is known add the number here. Note that MSISDN Extraction automatically adds the found number here.

Hide Caller ID – The user can override the Target's Handset settings and choose to hide or show the Targets ID to the commercial network.

Default – the Engage Gi2 system allows the commercial network decides whether to show or hide the caller ID

Hide – the Engage Gi2 system hides the caller ID. Note: Some commercial networks do NOT allow a Handset to hide the Caller ID, this may be a paid service or only by special request. In this case calls will fail. It is up to the system Operator to check whether this setting works on their networks or not.

Show – the Engage Gi2 systems shows the Caller ID

Note: This does not apply to Private Network. In a Private Network the MSISDN is always shown

Media Tab

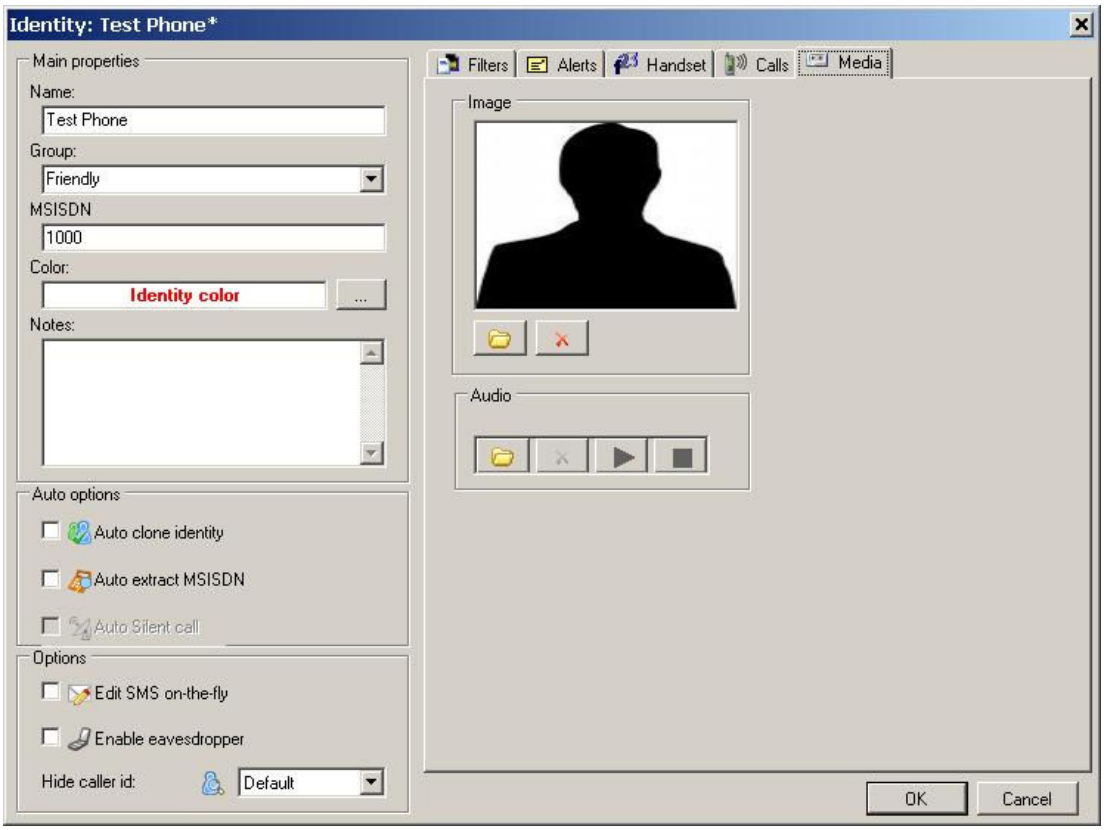


Figure 2-7.4: Identity Manager – Media Tab

Image – Add picture to the identity. Selected image will appear whenever the identity is captured.

Audio – Add sound alert to be played when the said identity is captured.

Filters Tab

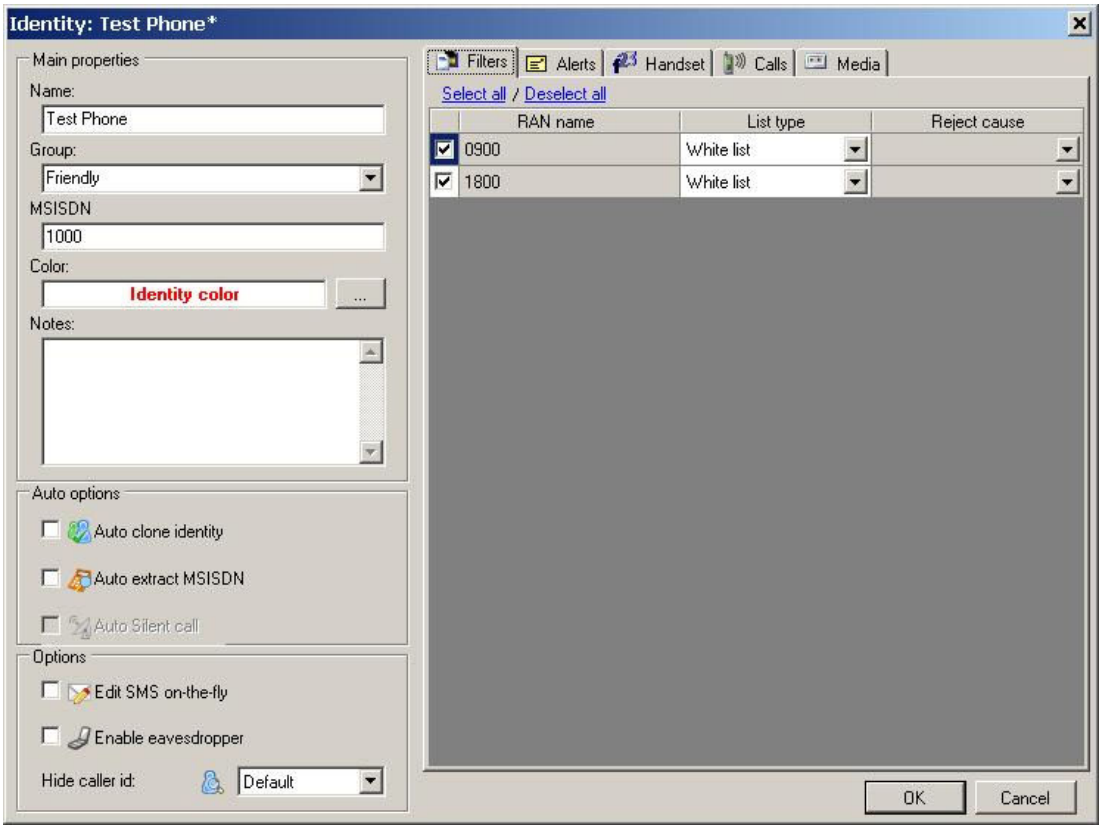


Figure 2-7.5: Identity Manager – Filters Tab

The Filters Tab allows the User to view whether a target is in the White or Blacklists and hence the mode of operation in the event the target is captured.

Note: i) The Lists are specific to one BTS. i.e. if you wish to capture and retain the Target regardless of which BTS you capture them on they must be added to the White List of all BTS's.

ii) Handsets can be in either the White or Black list, not both.

Alerts Tab

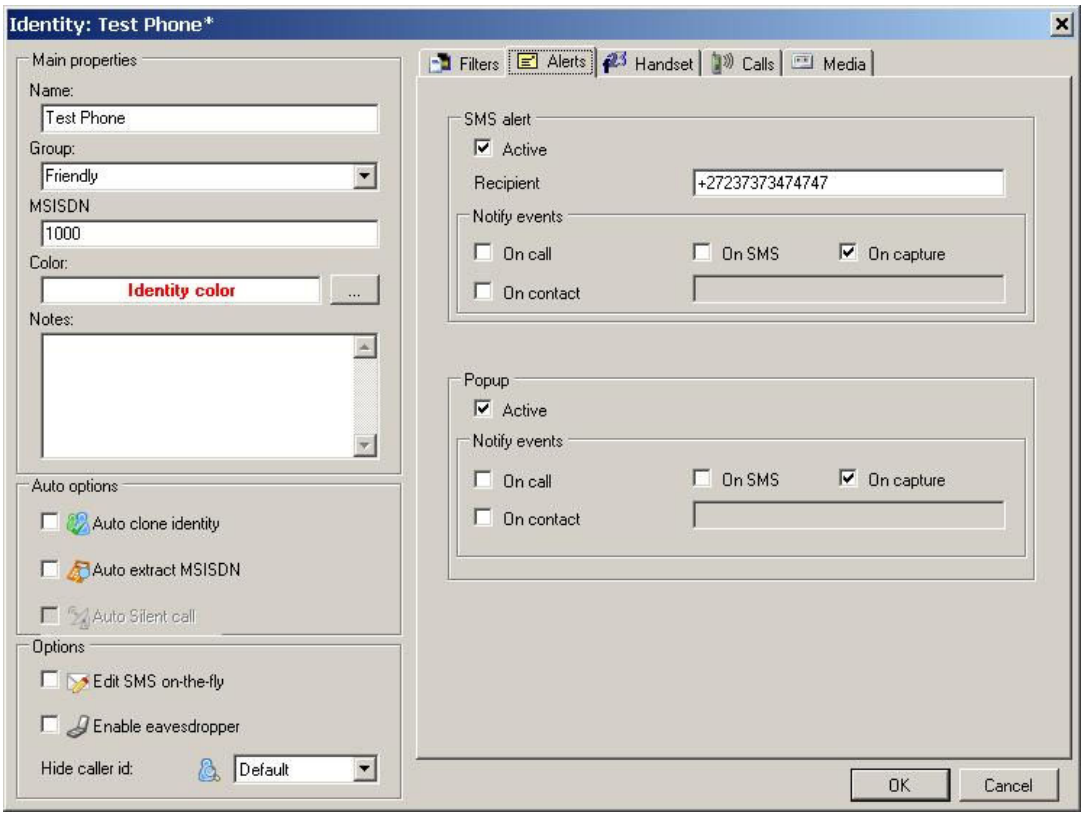


Figure 2-7.6: Identity Manager – Alerts Tab

SMS Alert (Opt.) – there is a possibility to send an SMS alert to a specific phone at the moment the identity was captured. For this option to work there is a need to insert a valid SIM card to the USB Modem. It is necessary to use a SIM card of a Network other than the Network on which the interrogation is taking place, ensure there is no PIN enabled and that the SIM has credit or on contract.

Active – Globally Enables or Disables the SMS Alerts

Recipient – The MSISDN to which the SMS Alert will be sent for any of the Notify Events.

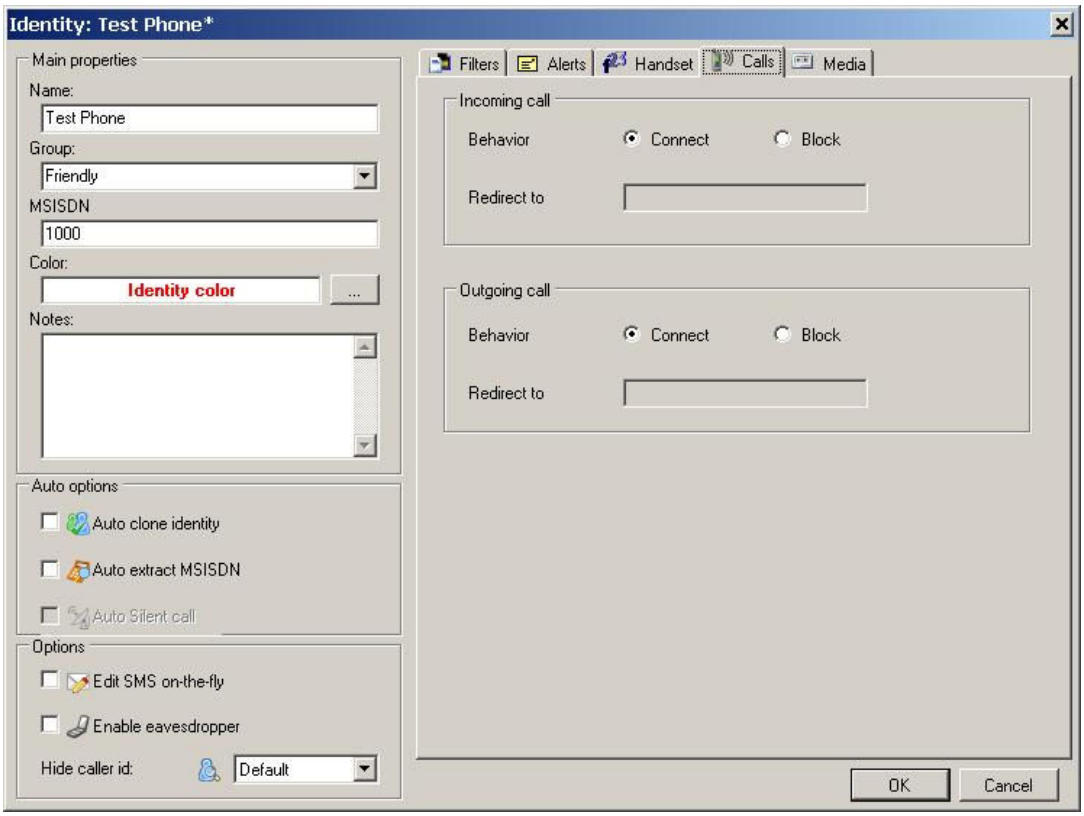
On Call – SMS Alert sent if the Target makes any outgoing call, (not implemented yet)

On SMS - SMS Alert sent if the Target sends an SMS, (not implemented yet)

On Capture - SMS Alert sent if the Target

On Contact – SMS alert when target calls or receives call from specified number, (not implemented yet).

Calls Tab



Incoming & Outgoing Call Connect & Redirect to - not currently implemented.

Block – All Incoming or Outgoing Calls to or from the Target are blocked. The call is automatically hung up with a call disconnected message.

2.7.3 Import Identities

Import Identities allows the user to import already existing identities defined in a CSV file.

Please refer to the later Section for the format the CSV file must have.

2.8 RF Calculator

The RF Calculator Function allows a user to determine the RF Frequency of a particular Channel or the Channel and Band of a particular frequency.

By entering any single 'known' value the rest of the associated parameters are populated.

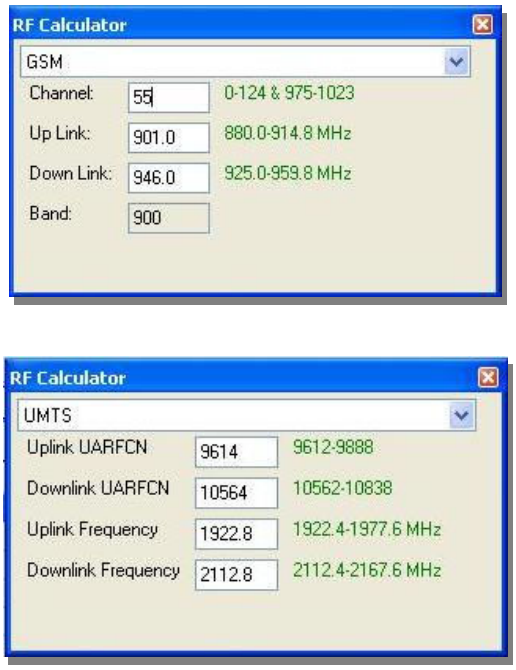


Figure 2-8: RF Calculator

3 Optional Components

3.1 SMS (Opt.)

Shows all the SMS' caught by the Engage Gi2 system. The System captures the SMS sent from inside the simulated network and the SMS coming from the real network if the target is cloned.

Join Same option makes sure that, if the phone retries several times to send the same SMS, due to the personal settings of the device, the user can hide all these retries and note the actions in the Join Count incremental field.

Figure 3-1: SMS grid

By right-click on any column header, a context menu pops up allowing the user to select only the information he wants to display. This configuration will be saved and loaded next time the user opens the application.

3.1.1 USSD Interception

Unlike SMS messages, USSD messages create a real-time connection during a USSD session. The connection remains open, allowing a two-way exchange of sequence of data with the commercial network.

USSD is often used for Call back services, Prepaid balance queries and balance top-ups.

The Engage Gi2 system also Intercepts these messages.

3.2 Fake SMS (Opt.)

Fake SMS option allows the user to send a message to a captured target, while pretending to be somebody else who sends it. Practically, the user can provide in the Number field any phone number to be displayed on the target's mobile display as sender.

This facility is available by right-clicking on the captured target's entry, then selecting "Send SMS to this mobile" menu option.

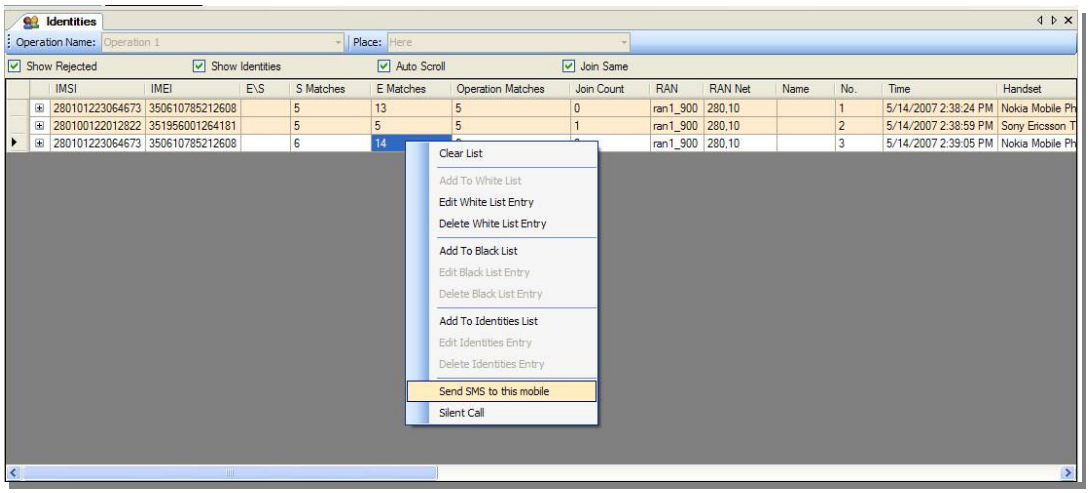


Figure 3-2: Identities grid – Fake SMS functionality

3.3 Alphanumeric SMS (Opt.)

This Option allows the user to send a Fake SMS from Alphanumeric (not just Numeric) Characters. The Reciepent of the SMS sees that the SMS is from the text as written.

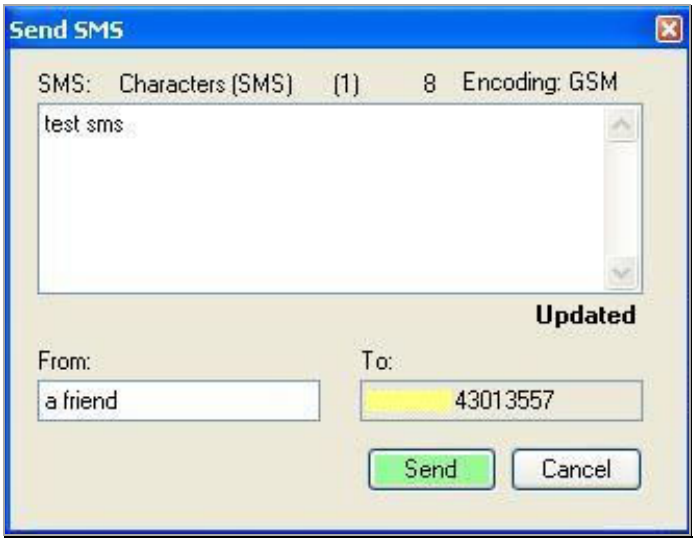


Figure 3-3: Fake SMS from Alphanumeric Characters

3.4 Edit SMS on the Fly (Opt.)

Once a Target is Cloned any Incoming or Outgoing SMS's can be modified before passing it onto the intended Recipient.

This functionality can be set for each Target individually within the ID Manager.

Figure 3-4.1: Edit SMS selectable in ID Manager

Figure 3-4.2: Edit SMS Pop-up on arrival of SMS

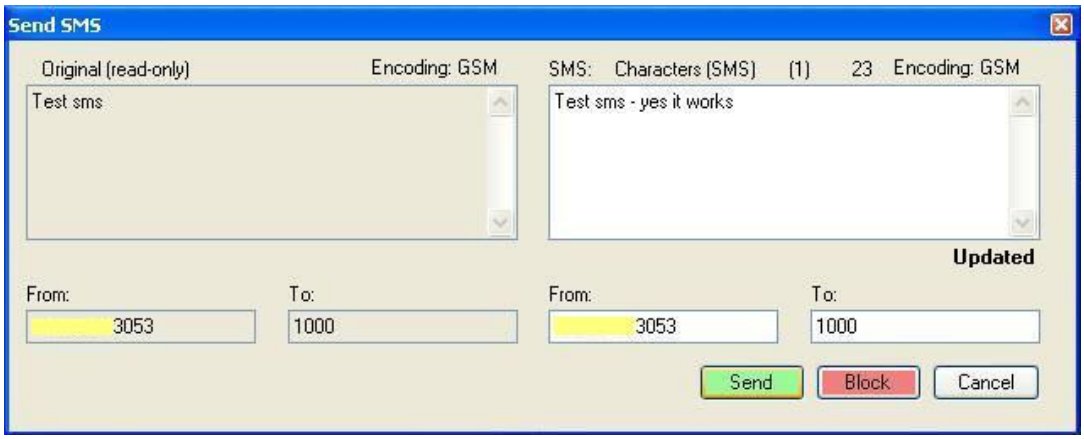


Figure 3-4.3: SMS is Edited and Forwarded

3.5 Scheduler (Opt.)

The Scheduler functionality is useful for users that need to transmit on different operators, or for those that need to cycle transmission between two or more networks and want to do this in an automated way. It is an easy way to save the presets from the beginning and load them as tasks that are part of a session.

To run a session, select an entry in the session tree and clicking on the Start Session button.

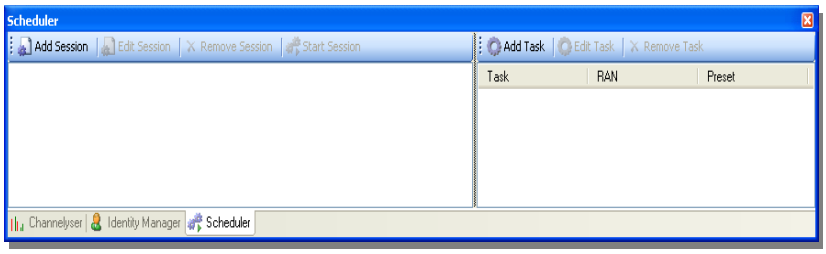


Figure 3-5.1: Scheduler User Interface

Add Session: a session comprises of a list of one or several tasks that will be launched at specific time stamps and that will run for a given duration. The tasks can be defined to run on different RAN's or the same RAN. Tasks that run on the same RAN cannot have overlapping times.

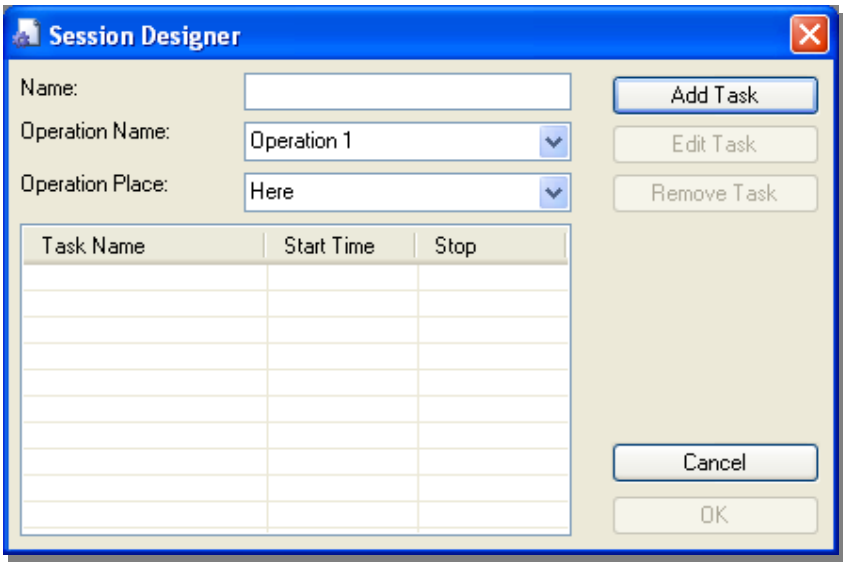


Figure 3-5.2: Session Designer User Interface

Add Task: a task is a single action that will be executed on the RAN. The user needs to provide a unique name to each task.

A Task uses a Preset of conditions. Therefore it is necessary to define the Preset as well. This can be done by modifying the Variables under a Preset in the RTX Control and then Updating that Preset.

Note, if a Task is scheduled and at any time in the future the Presets are modified, the modified presets are used.

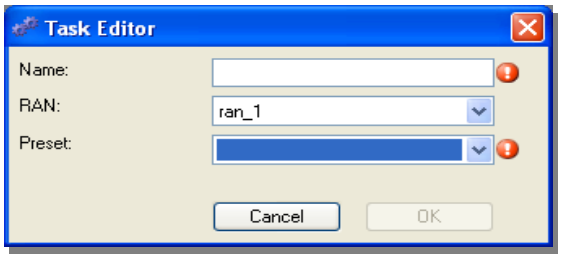


Figure 3-5.3: Task Editor User Interface

Only one session can be run at a particular point in time per BTS. The user will get a notification if the RAN's are already transmitting, being allowed to continue the operation (possible stopping the current transmission) or not. If the RAN's involved are not initialized, the Scheduler will perform this action prior to starting executing.

For the Scheduler to Run Correctly the following Checks should be made:

- The Preset has been named, variables set and Updated.
- A task using a particular RAN and Preset is defined.
- Tasks using the same RAN do not have a time overlap.
- A Session has been created containing one or more Tasks.
- The Session has been started.

3.6 Silent Call – GSM & UMTS (Opt.)

Introduction (GSM & UMTS)

The Silent Call function allows the System to activate any target phone's transmitter as a beacon for the purpose of direction finding (homing).
While a silent call is in progress, the phone display remains as in standby mode. However, during a silent call the target phone is disconnected from the real network, shifted to an unused channel ("Clear Channel") and cannot make or receive any calls. Different phone models behave differently if the user attempts to make a call while a silent call is in progress.

3.6.1 GSM Silent Call

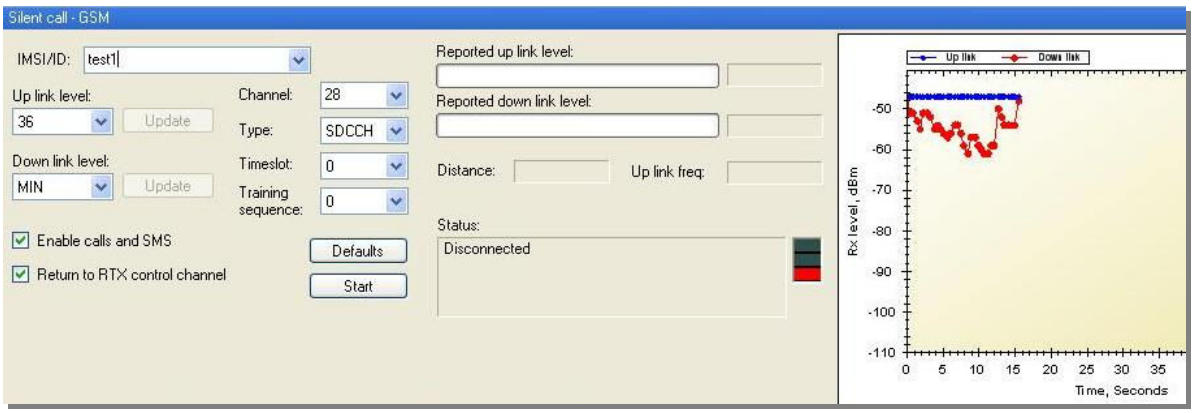


Figure 3-6.1: GSM Silent Call User Interface

Operating Sequence

There are 2 sequences to start the silent call process:

Silent call sequence on **Reject mode** and a different LAC:

- In order to effectively generate silent calls, the Manager application should be configured to operate in Reject mode
- Set a different LAC than the real operator and transmit
- The target phone's IMSI or IMEI should be included in the White List so as to capture it within the System and allocate a phone number, as defined in the White List.
- Once the target phone has been captured by the Engage Gi2 System, start the Silent Call console, from the toolbar or by right-clicking on the target row (on the table) and selecting "Silent Call".

Silent call sequence on **same LAC (Immediate Silent Call)**:

- In order to effectively generate silent calls, the Manager application should be configured to operate in the same LAC as the real operator
- Start the silent call from the tool menu, although the target and no other phone are displayed (while operating on the same LAC, phones will just "camp" on the Engage Gi2 System cell rather than register on it, meaning that they will not be displayed, however it will be possible to page them) .

Note: The Immediate Silent Call (same LAC and No White List Needed) has the benefit of having being quicker to Capture, can Capture of a greater distance and does not stand out from the Commercial Network.

However, it has the downside of Blocking ALL phones until the Target answers when it is not even known that the Target is in the area, therefore, it has a lack of awareness as well.

When deciding between using Accept or Reject Mode these factors should be taken into consideration.

[See “Operational Field Craft for Further Details”]

Proceed with the following, once silent call console is displayed:

a. Enter the targets IMSI (if required) or select from available Targets in the ID Manager
b. Enter\Verify that the shifted channel is in the same frequency band as the serving cell.
c. Select the desired channel type: SDCCH (Control Channel) [4]or TFR (Traffic Channel)
d. Click “Start” in order to activate the silent call. A progress graph indicates the strength of the signal received (uplink and downlink) during the progress of the silent call.
e. Once the target is captured and silent call is in progress, the serving cell simulated by the Engage Gi2 System will be as the shifted channel and will remain so until modified by the user.
Since the "shifted channel" is usually a "Clear channel", the registration process will seem to be stopped due to the fact that this channel is unfamiliar to other phones.
f. Click the "Stop" button to stop the silent call. It will take several second (~25 sec) to stop it.

If Return to RTX control Channel is checked, the presets panel will hold its original Channel number instead of the homing channel number, after the Silent Call window is closed properly.

3.6.2 UMTS Silent Call

Similar to the GSM Silent Call the UMTS Silent Call can be initiated without first capturing the Target, just as long as the IMSI is known.

a. Either run a UMTS Channelyser scan or open a scan for your location using the Channelyser Logger
b. Set the RTX Control Mode to Silent Call. Use a PSC that is in the Neighbour list but is not in use by the Commercial Operator

[4] Preferred method when utilizing both Spectrum Analyzer and Icom homing devices

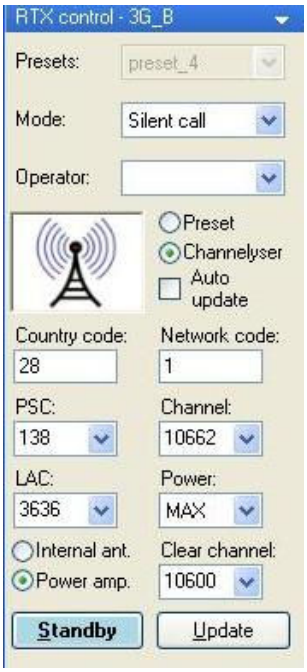


Figure 3-6.2: UMTS Silent Call

c. In the Silent Call Window, enter the IMSI of the Target. (Can be selected from the Identity Manager)

d. Select Start

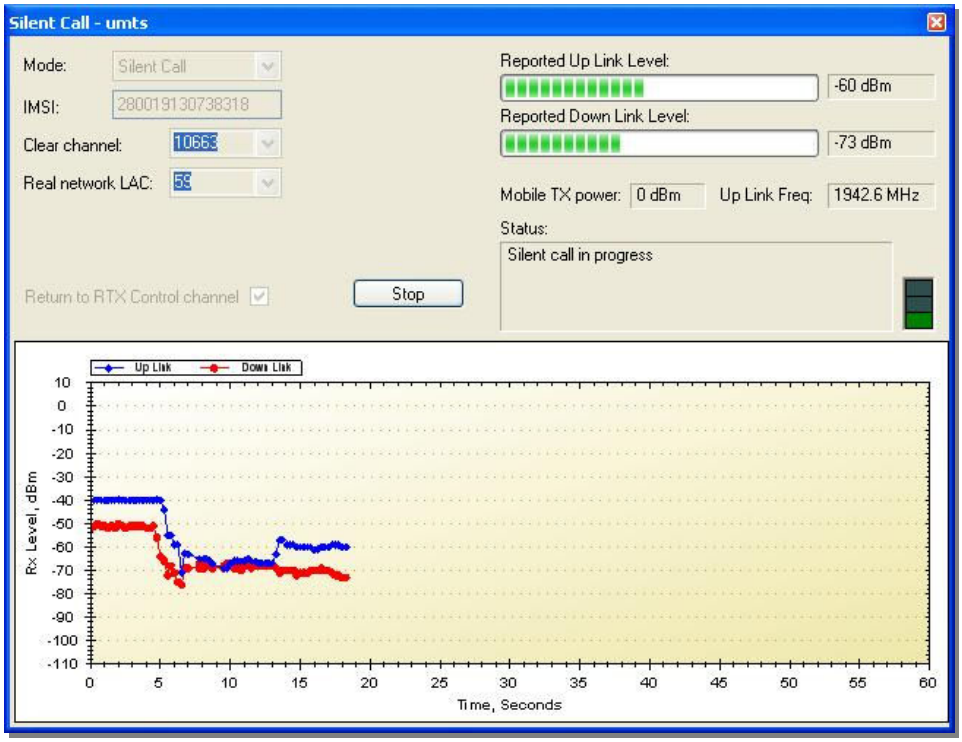


Figure 3-6.3: UMTS Silent Call User Interface

e. The Silent Call is Initiated

3.7 Target Isolator (Opt.)

The Target Isolator is designed to be used primarily with a GCR (See later Section). The benefit of using the Target Isolator is that it moves the Target to a Clear Channel thus allowing the Target to remain captured even while on the move.

Once the Target is Captured e.g. in the White List -> Right Click -> Isolate Target

Select the Ran to which the Targets should be moved

Enter the previously determined Clear Channel (Use the Channelyser Graph and Check Channel Function).

The Engage Gi2 System will page the Handset.

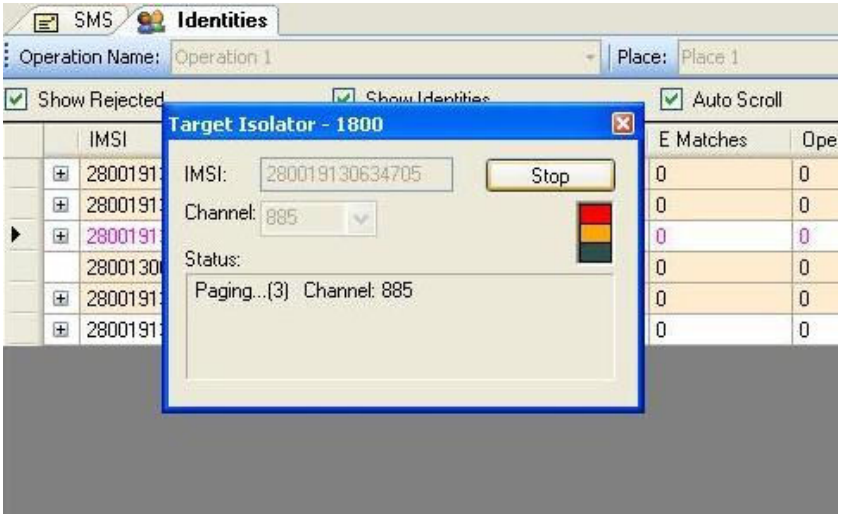


Figure 3-7.1: Target Isolator - Paging

Once the Target answers the paging it is moved to the Clear Channel.

Figure 3-7.2: Target Isolator - Captured

Note that the RTX Control Window Channel has been updated to be the same as the Clear Channel and that the target has been captured on that channel.

	Time	ID	IMSI	IMEI	E\S\T	RAN	Status	(U)ARFCN
⊞	02/07/2010 15:04:07		280019130367812	011365003630294		gsm		517
⊞	02/07/2010 15:04:08		280019130152990	357994010201567		gsm		517
⊞	02/07/2010 15:04:11	12	280019130738318	350606601708712	S	gsm203	Target isolated	650
⊞	02/07/2010 15:04:15		280019130342228	354750003805514		gsm		517
⊞	02/07/2010 15:04:16		280019130356668	355165003852375		gsm		517
⊞	02/07/2010 15:04:17		280011001019416	355241034158676		gsm		517
⊞	02/07/2010 15:04:17		280019130227261	359811012709397		gsm		517

Figure 3-7.3: Target Isolator – Status Change

a. Isolating Target: light (bright) orange – indication when starting isolation
b. Target isolated: light pink
c. Unsuccessful: white if stays on source RAN – as Accepted. Target moves back to this state if isolation fails after 3 retries.

Note: Target Isolation can be applied to multiple targets simultaneously. In this case the Right Click Menu is available for additional Targets, that, if selected are moved to the same Clear Channel. This applies for Multiple BTS systems only.

3.8 GSM Call Routers - GCRs (Opt.)

[Not currently available for UMTS handsets]

Introduction

GCR's come in many types, they can come in the following combinations:

- Outgoing call GCR (Unidirectional GCR)
- In\ Out going call GCR (BiDirectional GCR)
- Single \ Multiple modems

Unidirectional GCR (UNI)

The GSM Call Router (GCR) kit and application enable the Engage Gi2 System to route a voice call originated by a target phone captured by the System to the real GSM network via the GCR kit. In this mode, the SIM card inserted into the GSM terminal in the GCR kit is billed for the calls made by the target.

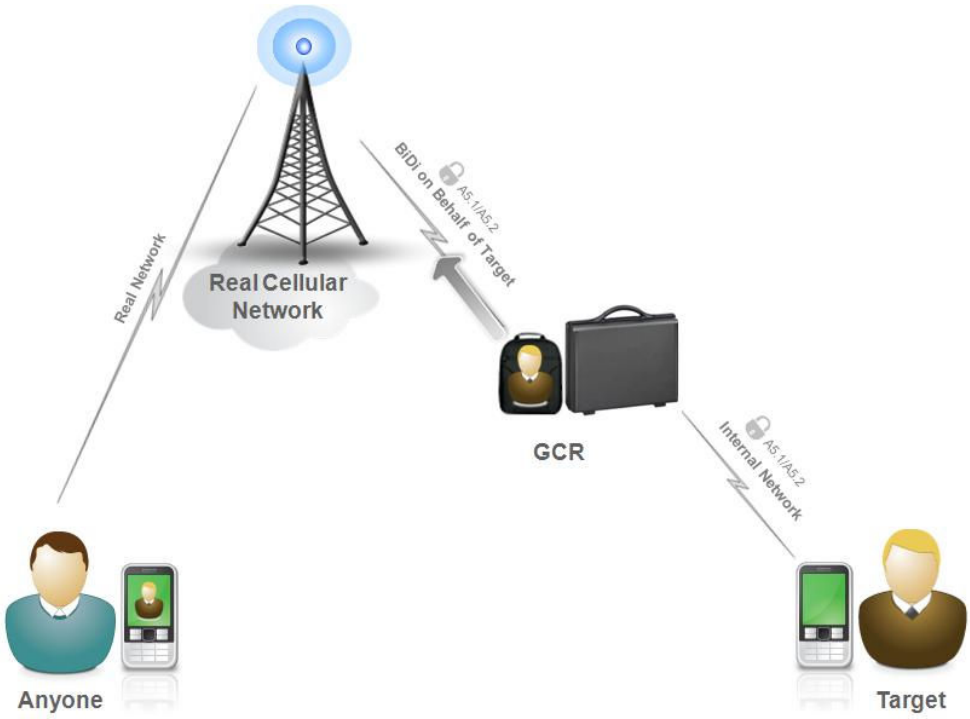


Figure 3-8.1: GCR Operational Concept

Operating Sequence

a. Verify the Uni is Off
b. Insert a SIM Card. It is recommended that the SIM be on 'Contract' or 'Post-Paid'. Pre-Paid can be used but there is a risk of running out of credit. The SIM should also not have any PIN Codes set.
c. Keep the Uni a distance of 1m or greater away from the BTS.
d. Place the antenna in a good location. I.e. High and Far away from the System and Uni. Good reception can be verified by observing the RxLev on the Uni GUI. The

Antenna should also be placed on a metal surface as this greatly improves the range.

e. Turn on and Initialise the Uni

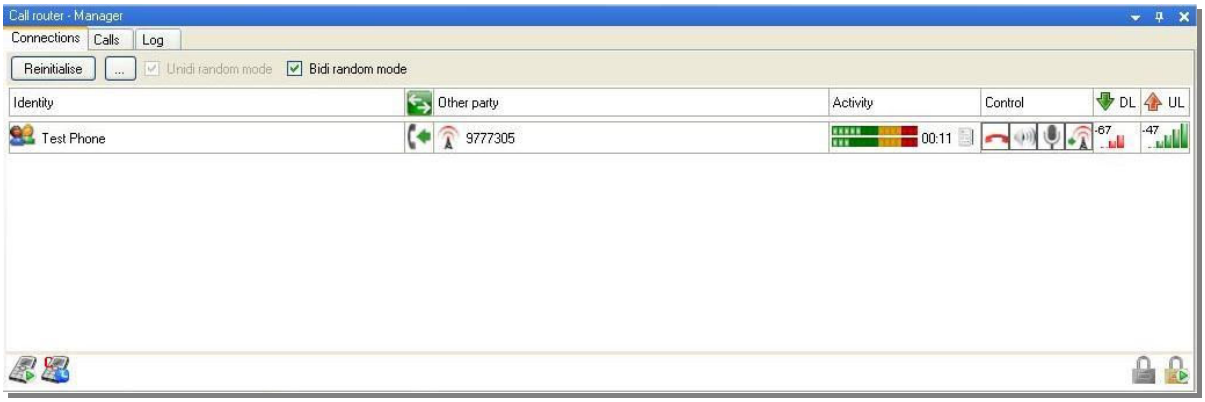


Figure 3-8.2: GCR Manager

Initialize: operation will detect all the GCR's attached to the unit and connect them to the available, already initialized, RAN's.

Bidirectional GCR (BiDi)

The BiDi incorporates all the functionality of the Uni-GCR but can work with Incoming calls as well. By emulating the Target's SIM and extracting the Kc, which is used for ciphering calls, the phone can be 'Cloned' by the system.

Note that a phone can be cloned with the BiDi if it supports A5/2 Encryption. If the Phone supports A5/1 Encryption only then a separate additional system is required.

If Bidi Random Mode is Enabled:

- GCR automatically allocates Scanners for all active networks. If a scanner cannot be allocated immediately it will be allocated when a modem is available.
- Target Mode is allowed

If Bidi Random Mode + Uni is Enabled:

- GCR automatically creates unidi for outgoing calls from targets whos ciphering cannot be broken. i.e. A51 Targets when only A52 breaker is available.

If Bidi Random Mode is Enabled & Uni Random Mode Disabled:

- Outgoing call from a target with unbreakable Kc is possible only in target mode (Dedicate router)

If Bidi Random Mode is Disabled:

- No Scanner is allocated.
- Bidi operations are possible only in target mode (Clone target)

If Bidi Random Mode is Disabled & Uni Random Mode Enabled

- GCR dedicates unidis from all available SIM readers. (it doesn't happen if bidi random mode is enabled see above)

- Unidi calls are served by the dedicated unidis.

If all Random Mode disabled:

- Only target mode is available (Clone target, Dedicate router). All random mode operations are dropped.

DTMF Interception:

During any call the DTMF Tones are automatically intercepted. These are visable in the 'Call Window' for that particular call.

Core Functionality Matrix

Function	Description	System Only	System + Uni	System + BiDi
Incoming SMS	Intercepted (Can be Forwarded to Target)	×	×	✓
Outgoing SMS	Intercepted (Can be Forwarded to Recipient)	×	×	✓
	Viewed Only (not Forwarded to Recipient)	✓	✓	✓
Send Fake SMS	To Captured Handset	✓	✓	✓
	From Captured Handset to any Recipient	×	×	✓
Incoming Calls	To the Captured Handset	×	×	✓
Outgoing Calls	(Note:Uni has Caller ID withheld)	×	✓	✓
Fake Calls	Make Outgoing Calls from Targets Handset	×	×	✓
Make Calls To	Make incoming Calls to Targets Handset from Laptop	✓	✓	✓
Make Calls From	Make Outgoing Calls from Targets Handset using Laptop	×	×	✓
Private Network	Voice and SMS	✓	✓	✓

✓	Possible
×	Not Possible

Figure 3-8.3: GCR Functionality Matrix

The following menu items are common to all GCR's.

Connections Tab:

RxLev: represents the Real network Rx Level as observed by the GCR Modem

Note: the status indicator turns green after the GCR has been properly detected and initialized. The indication is shown as a green triangle on the Modem in the bottom left

of the Connections Tab.**Reinitialize**: reinitializes the GCR and connects it to the active RAN's.

Calls Tab: holds the list of the recorded and unrecorded call of the current session. The calls can be played within the Engage Gi2 System. All calls ever recorded by the System can be found under: C:\Program Files\...\AudioCalls\ and can be played with any external player that supports .wav files.

The Engage Gi2 System supports multi GCR system. All the GCR's detected during Initialization will be displayed as boxes similar to the one in the previous example.

From Left to right...

Identity: The ID of the Target in the call.

Incoming / Outgoing Call Indication. Arrow pointing right is Outgoing call i.e. call made by Target. Arrow pointing left is Incoming Call.

Other Party: Non captured target's MSISDN. Note: Caller ID may not be available for all Incoming calls.

Activity: Call Signal Strength, Call Duration and DTMF Tones. White box goes Bold when tones are sent. Hover over the box to see the Tones. Note: they are also available in the Calls Tab once the Call has ended.

Control: Hang-up - Ends the ongoing Call

Speaker Icon - Mutes the Laptop speaker for this call only

Eavesdropper - Enables / Disables Eavesdropper. See Eavesdropper Section.

Release to Real Network – Hands the call over to the Real Network

DL: Downlink level, the power that the system sees the Real Network

UL: Uplink level, the power that the System sees the Captured Target

Network: the MCC and MNC of the network currently registered to, or Unknown if the modem is not on a network.

a. After the GCR is properly initialized and connected to the real network, calls can be performed from within the System.

   When the target dials a number, the action will be visible in the Log of the Call Router Manager as well as in the personal log of the designated GCR.

b. After the call has finished, the log file will display an appropriate message and the recording will be listed and ready to be played in the Calls Tab. Audio files are stored as wav files under C:\Program Files\...\AudioCalls\ directory

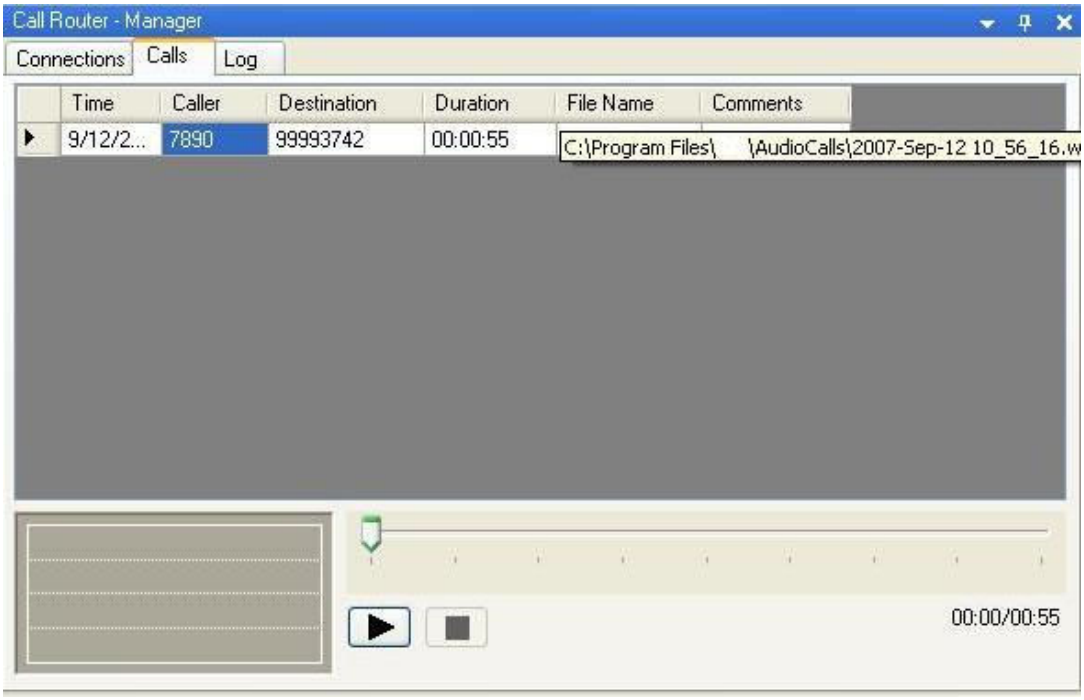
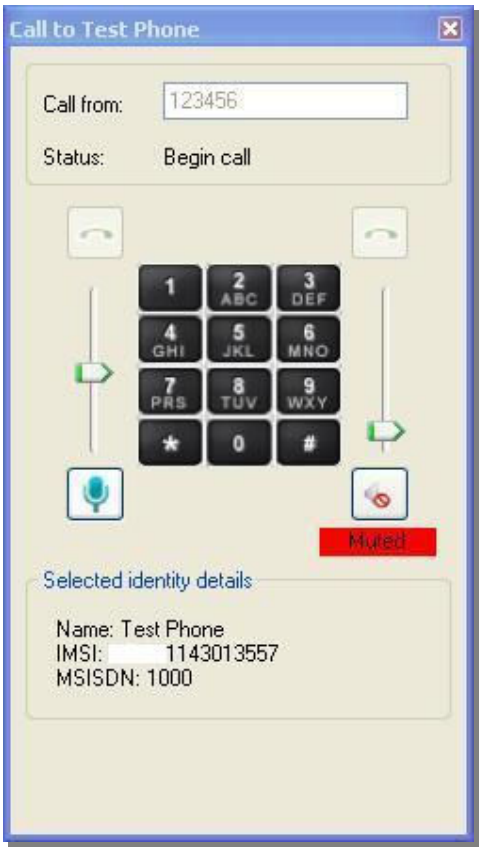


Figure 3-8.4: Calls Tab

3.9 'Make Call To' Target (Opt.)

A call can be made directly to a captured Target (incoming call) using the laptop Mic and Speakers.



'Call from': can be any number the System operator chooses.

Mic Volume: volume of the users (laptop) microphone

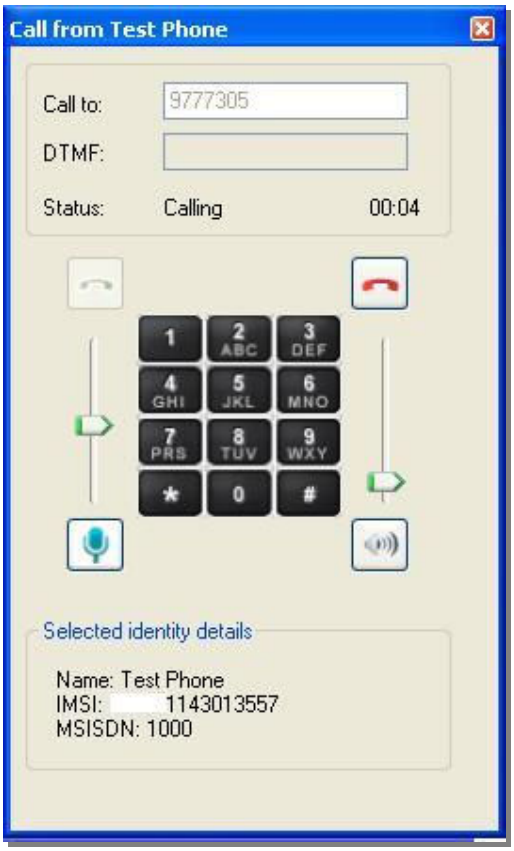
Speaker Volume: volume of the users (laptop) speaker

DTMF: is sent an received.

Note: even when the speaker volume is muted, both sides of the conversation are recorded.

3.10 ‘Make Call From’ Target (Opt.)

When a Bidi GCR is available, (i.e. Target can be cloned.) then a call can be made from the captured Target’s phone (outgoing call) using the laptop Mic and Speakers.



‘Call from’: is the real number of the person the user wishes to call FROM the targets Phone. (Caller ID will not be withheld)

Mic Volume: volume of the users (laptop) microphone

Speaker Volume: volume of the users (laptop) speaker

DTMF: is sent an recieved.

3.11 Phone Correlator (Opt.)

The Phone Correlator Determines the TMSI from the MSISDN.

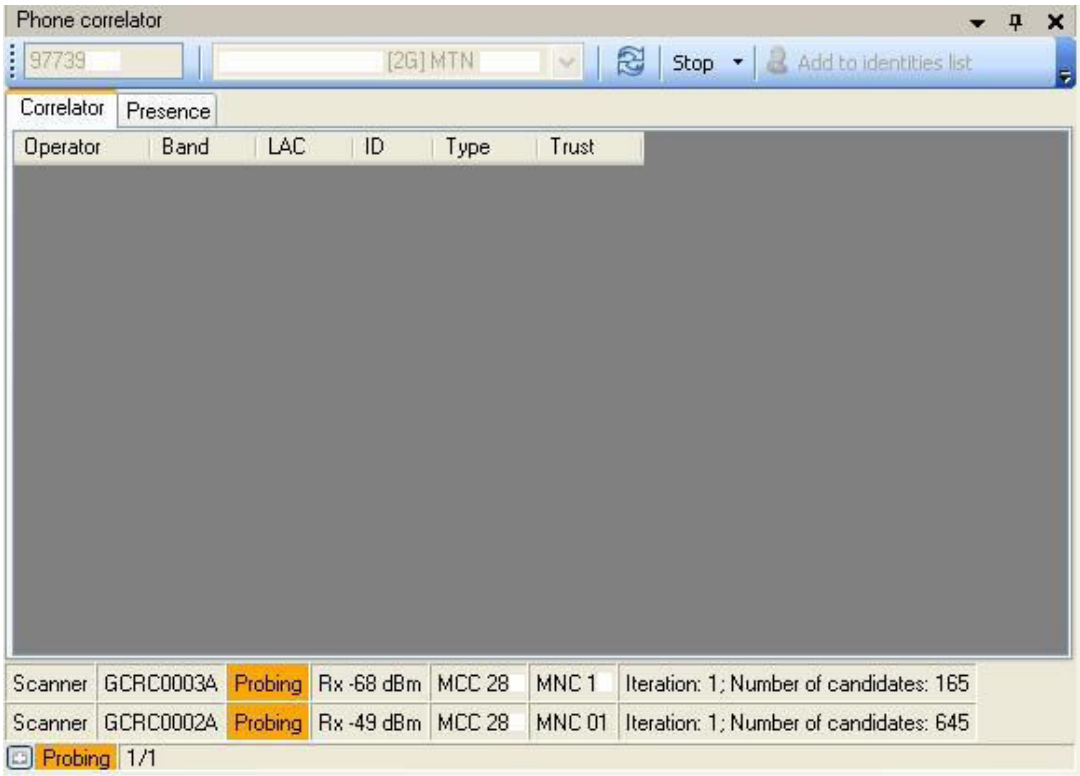


Figure 3-11.1: Phone Correlator Probing

The Phone Correlator function allows a user to determine the TMSI and consequently the IMEI & IMSI of a Target from the Targets MSISDN.

Active Method

a. Run or Open a Channelyser Scan for your location

b. Initialise the Phone Correlator

c. Refresh the Network Operator List

Note: If the network and/or LAC of the Target is known uncheck all other Operators. This will considerably reduce the time needed to find the Target.

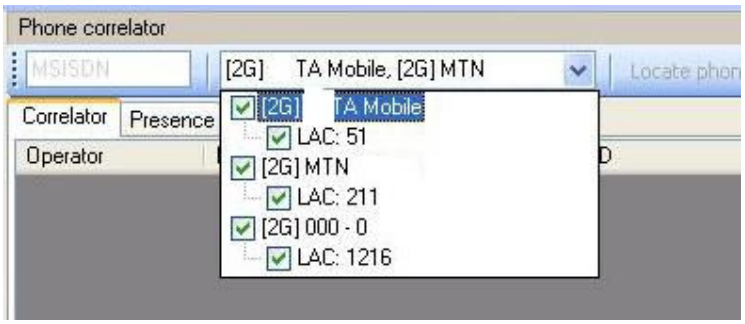


Figure 3.11.2: Phone Correlator – Network & LAC selection

d. Enter the MSISDN of the Target

e. Click Locate Phone. Once a likely Candidate is found the TMSI has now been identified.

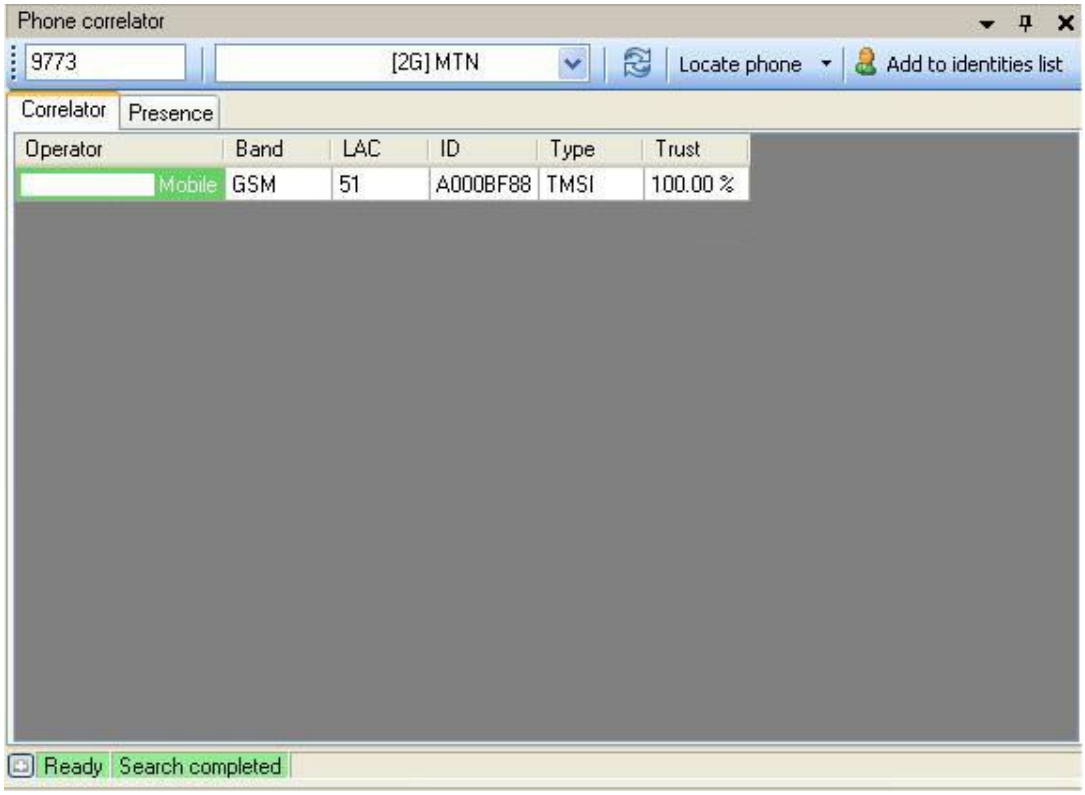


Figure 3-11.3: Phone Correlator Results

f. Add the Candidate to the White List and Identity Manager.

Note: If no candidate is found then it is possible that the Target is not in the LAC or has their handset switched off.

g. Attempt to Capture the Target by interrogating the Local Network

h. If the target is within range of the Engage Gi2 System and is Captured then the IMSI and IMEI will now be identified from the TMSI.

Note: If the Candidate was added to the White list and Identity Manager and subsequently Captured then the System will automatically update the Targets IMEI and IMSI.

Passive Method

Note The Passive method has the added feature of allowing the user to determine whether the Targets handset is on or not, this works as long as the phone is registered to a network that supports SMS Status Updates and works independently of where the phone is in the world.

Disadvantage of the Active and Passive Methods

The disadvantage of the active method is that the targets phone might ring, the system has an inbuilt emergency stop if this is detected.The disadvantage with the Passive method is that if a network charges for SMS reception this may show on the bill.Note: The Phone Correlator should always be tested using a Test phone with Netmonitor. This is to ensure any possible chance that the Target is alerted be prevented.

Check Presence

If the Commercial Network supports Silent SMS and Delivery Report then whether the Target's phone is on or not can be determined.

Again, this must be tested before using Operationally.

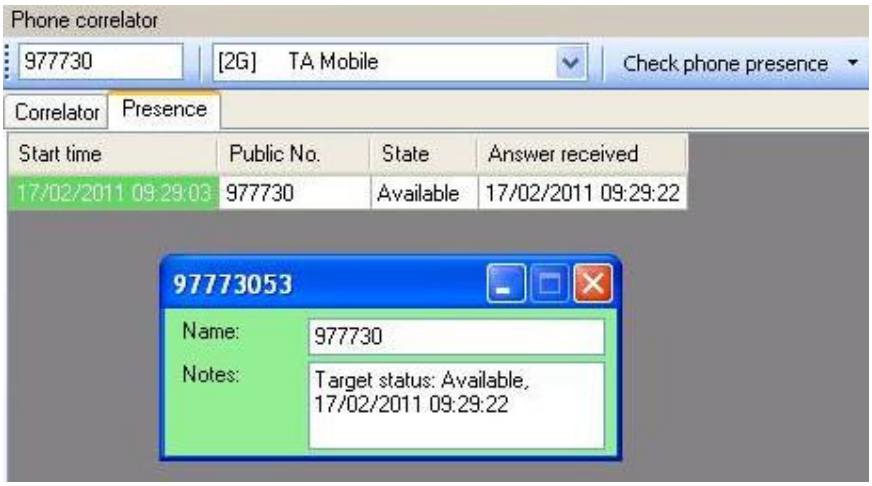


Figure 3-11.4: Check Presence Results

3.12 Auto SMS (Opt)

Auto SMS allows to user to send a particular message to Captured Handsets from any MSISDN of the users choosing.

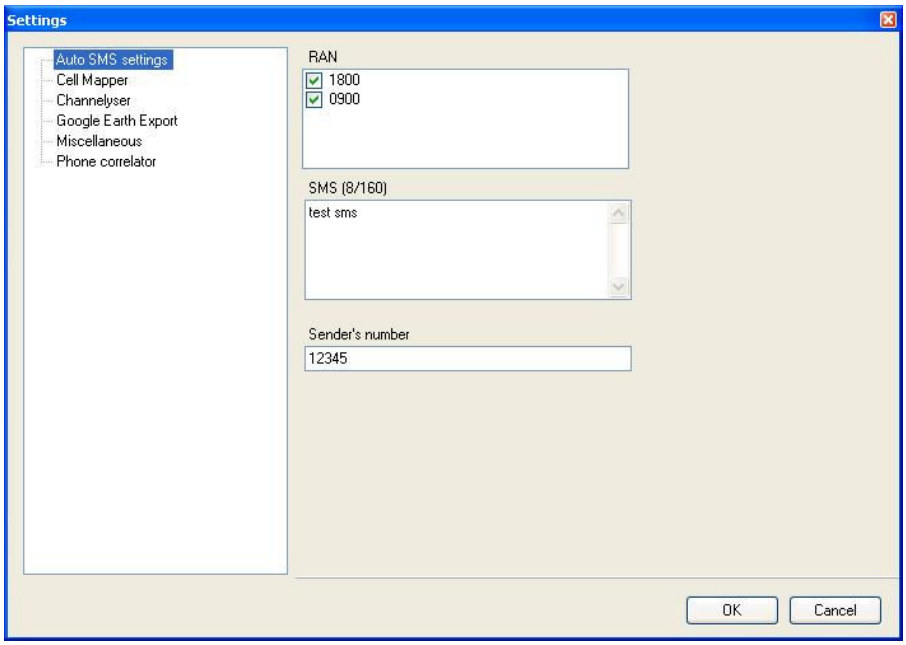


Figure 3-12.1: Auto SMS

I. For a particular RAN the user defines the message to be sent and the number from which the SMS will appear to have been sent.

II. Once any Handset is Captured the system will send the SMS.

Note 1) This funtionality is RAN Specific. i.e. target captured on a Ran not ‘checked’ will not recieve an SMS

Note 2) This functionality can be used in conjuction with ‘Accept Mode’ to send a single SMS’s to multiple Handsets simultaneously.

3.13 Eavesdropper (Opt)

Eavesdropper enables the Engage Gi2 System User to listen and record audio from a Captured Target’s handset*.

This functionality turns a target’s own mobile phone against the Target by turning it into a “bug” & allows the user to have even more situational awareness.

* Currently over 70% of handsets / SIM combinations are supported

** GCR is required if to be used whilst Target is Cloned (Work with Uni as well)

Functionality: Send Advertising

For any Captured handset i.e. in the White List, the Engage Gi2 System User can choose to initiate the Eavesdropper manually by choosing the ‘Send Advertising’ button.

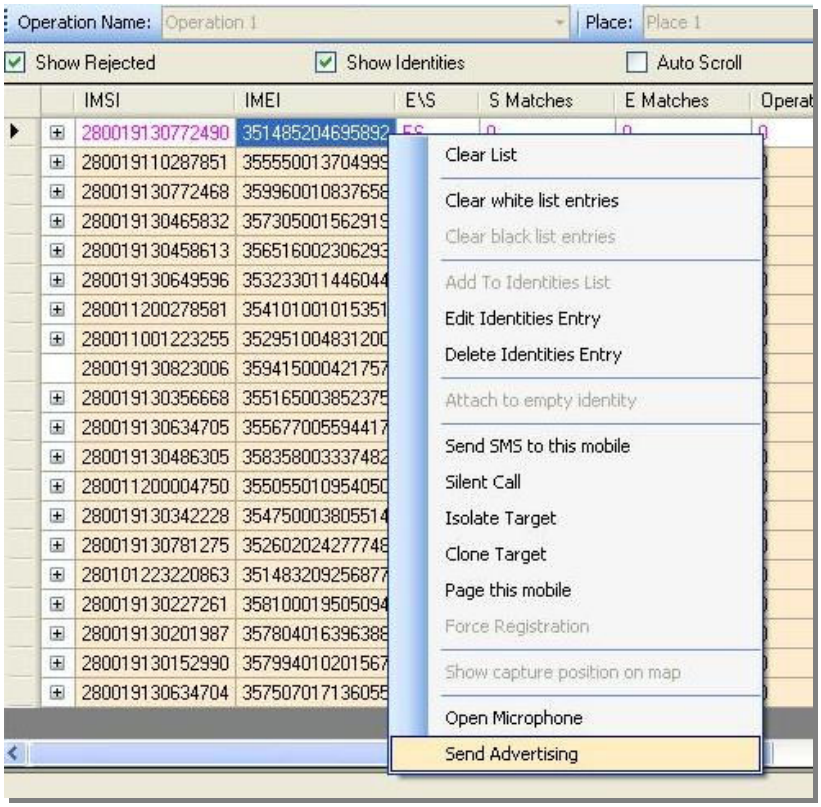


Figure 3-13.1: Send Advertising

The Engage Gi2 System initiates a call to the Target, the Target’s phone rings. Independent of whether the Target chooses to answer the call or not the Mic is opened and all audio is recorded.

There is an indication of the Eavesdropper status and the call is visible in the Call Router Manager window.

Note: The voice from the Target's mobile is being recorded from the time the mobile starts ringing. The voice will continue to be recorded *after* the target hangs up. In order to record the voice after the Target hangs up, the Mic icon in the call dialog must be green.

Recording the sound after the target hangs up has the following characteristics:

- The Target must be the one to hang up the call. If the other party hangs up, the Target will hear silence.
- The phone display will show that the Target is still in a call.

The System User can choose to close this Audio connection and thus stop recording by selecting the 'Hang Up' button.

If the Target chooses to answer the call then a User defined pre-recorded message is sent to the Target. E.g. Dead air, dropped dial tone, voice recording etc.

Eavesdropper and Cloning

When the Target is Cloned, and any incoming or outgoing call is initiated, the System User can choose to use the Eavesdropper. This will cause the Incoming and Outgoing audio to be recorded (as per normal for cloning) but once the call is ended it will continue recording the audio being picked up by the Target's handset. This recording will continue until the User 'Hangs Up'. Again, this can be seen in the Call Router Manager.

The benefit of using Eavesdropper and Cloning is that a 'fake call' (Send Advertising) does not have to be made to the Target.

The downside is that the User must wait until the Target makes or receives a call.

Multiple Captured Targets

If two Targets are captured, i.e. in the White List, and one calls the other then the Eavesdropper can be used. As previously described, the User can choose to record the incoming and outgoing audio and whether to leave the Mic open after the call has been ended by either Target.

Note: In order for one Target to call another, as in the case above, the 'real' MSISDN must be entered into the Identity Manager by the User.

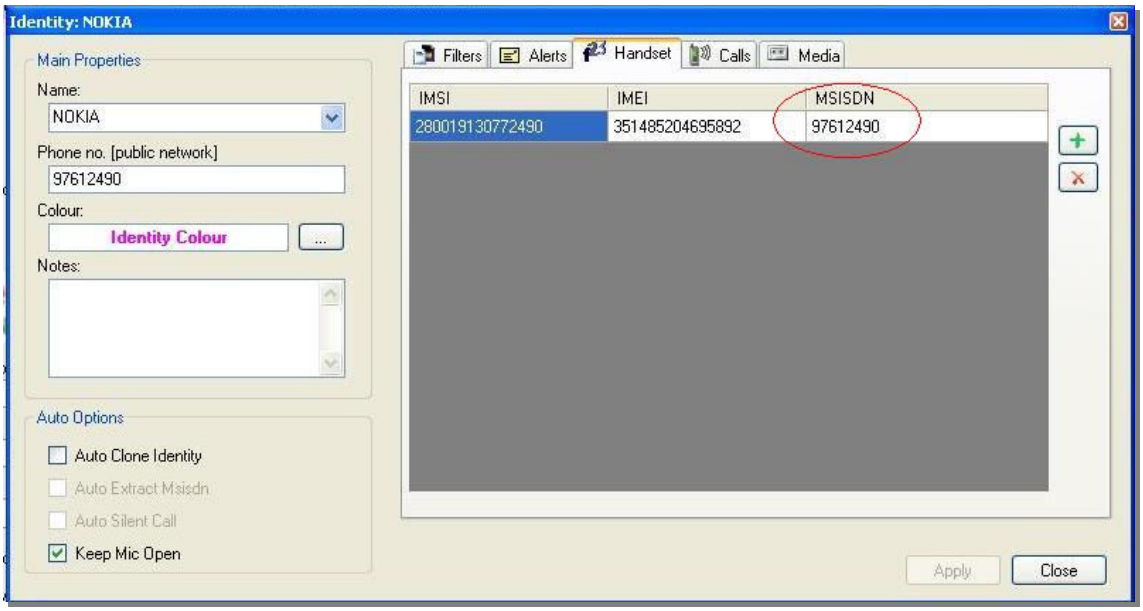


Figure 3-13.4: Multiple Targets - real MSISDN must be used

Eavesdropper Settings

The MSISDN from which the Advertising is sent is defined in the Eavesdropper Settings. In addition, the Advertising Audio File that is played in the event the Captured Identity answers the phone is also defined in the Eavesdropper Settings.

Figure 3-13.5: Eavesdropper Settings – Calling Numbers

I. A list of number that is the user wishes to use can be stored under the 'Calling Numbers' Tab.

II. The number that will be shown on the Targets Handset is the number with the Green Tick next to it. This can be overridden by selecting the 'Hide Number' check box. In this case Caller ID will be withheld.

Figure 3-13.6: Eavesdropper Settings – Advertising

I. A list of Advertising messages that is the user wishes to use can be stored under the 'Advertising' Tab.

II. The Message with the Green tick next to it is the message that will be used.

III. The Audio Files must be of Type "GSM .wav".

CAUTIONARY NOTE: When choosing to 'Send Adverting' by right clicking a Target in the Identities Grid, the Number and Message will be automatically taken from the Eavesdropper Settings. The user should be sure that the correct number and message are selected before sending the Advertising.

3.14 Channelyser Logger (Opt)

It is possible to see a history of Channelyser scans. Go to, View -> Channelyser Logs

Time	Operation	Place	Type	GPS Lon	GPS Lat
29/10/2008 1:06:59 µµ	Operation 1	Place 1	Spectrum	0.0	0.0
29/10/2008 1:58:06 µµ	Operation 1	Place 1	Spectrum	0.0	0.0
29/10/2008 2:08:51 µµ	Operation 1	Place 1	Spectrum	0.0	0.0
29/10/2008 2:19:19 µµ	Operation 1	Place 1	Spectrum	0.0	0.0
29/10/2008 2:32:13 µµ	Operation 1	Place 1	Spectrum	0.0	0.0
29/10/2008 2:44:55 µµ	Operation 1	Place 1	Spectrum	0.0	0.0

Figure 3-14.1: Channelyser Logs

By Double Clicking any particular Log you are then able to see the details for that scan.

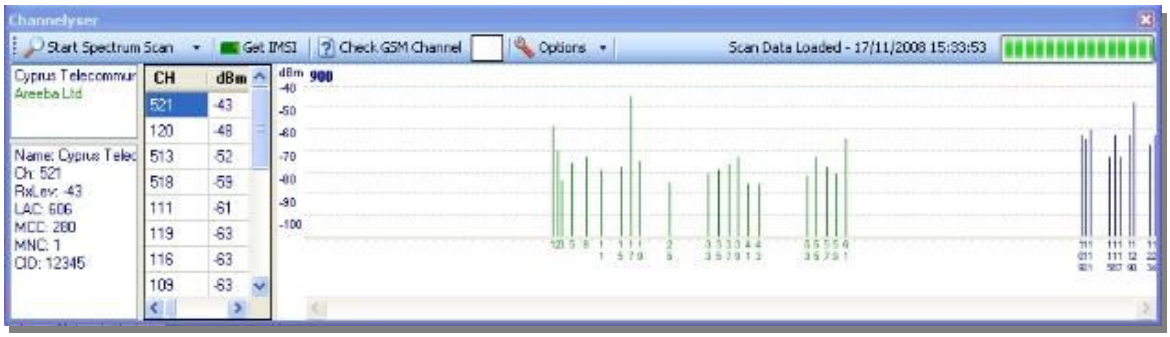


Figure 3-14.2: Channelyser Log Details

3.15 GPS & Geolocation (Opt)

GPS: this is the location of the Engage Gi2 Unit. The external GPS antenna is required with line of sight of GPS Satellites.

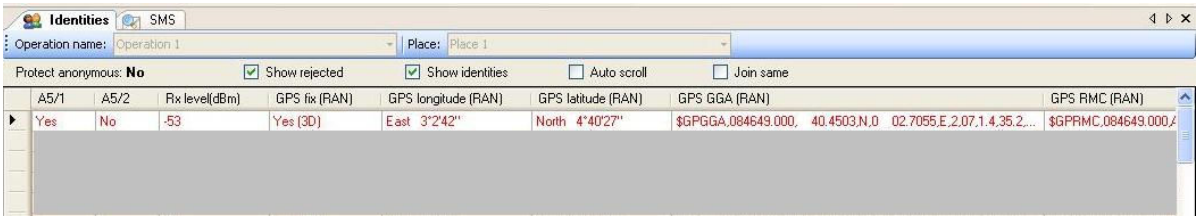


Figure 3-15.1: GPS of Unit

Geolocation:

Prerequisits:

Internet Access with a connection to the Positioning Server

GPS Antenna Connected

Valid Channelyser Scan

Once Captured GPS Data is displayed as below

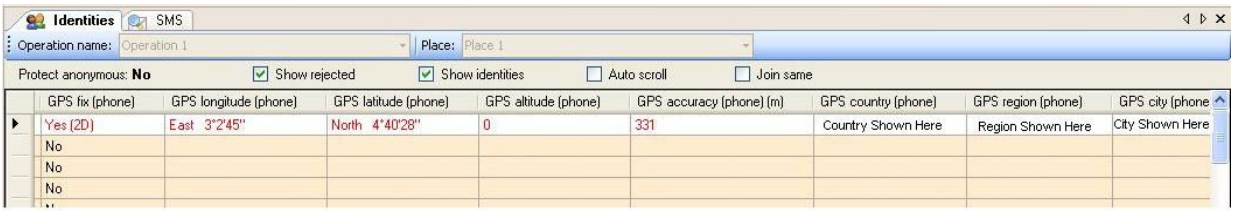


Figure 3-15.2: GPS of Target

In addition, the relative signal strengths of the surrounding BTS's are displayed.

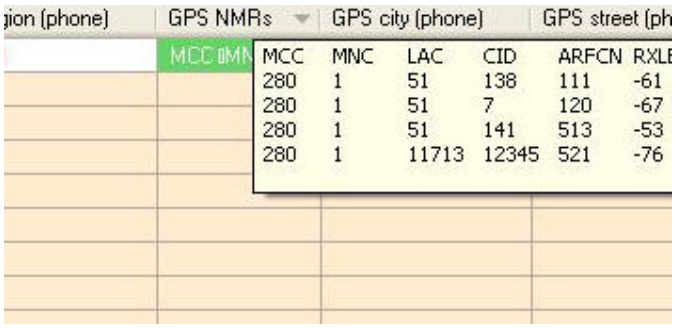


Figure 3-15.3: NMRs of Target

When Transmitting select the Target, then select ‘Show Capture Position on Map’.

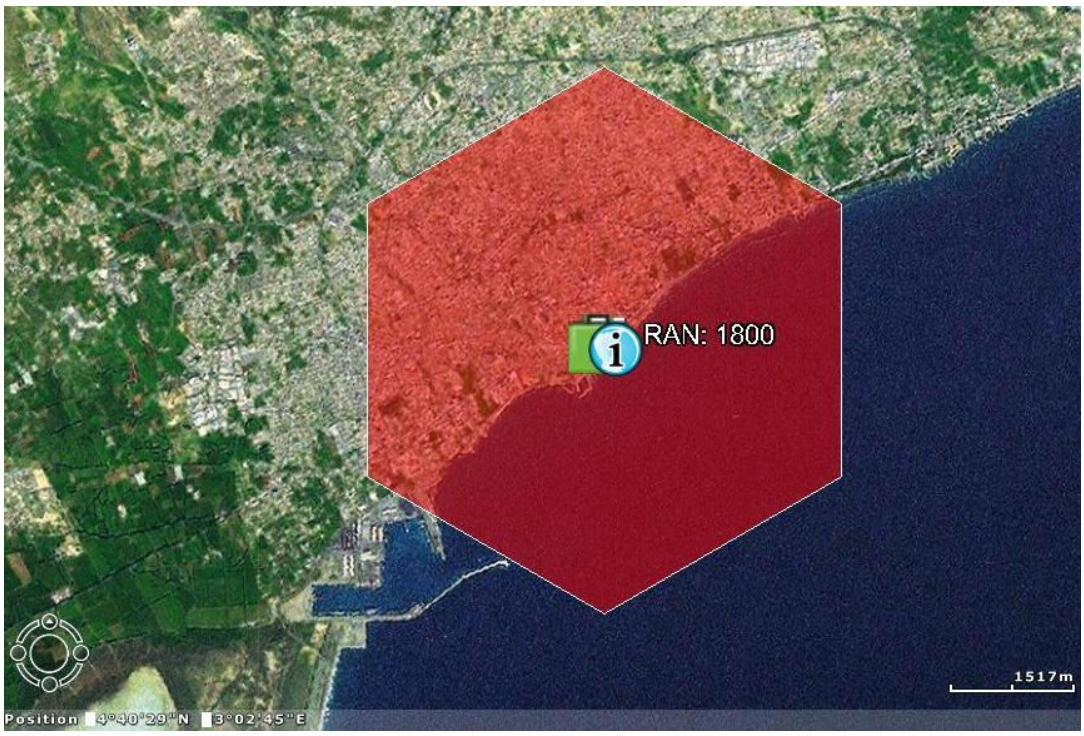


Figure 3-15.4: GPS of Unit on Map

Note that accuracy information is also displayed.

4 Data Analysis

4.1 Back Office (Data Manager)

All the information gathered by the System is stored in a MySQL database.

The Data Manager tool provides convenient data retrieval and analysis based on the information stored in the Engage Gi2 System database.

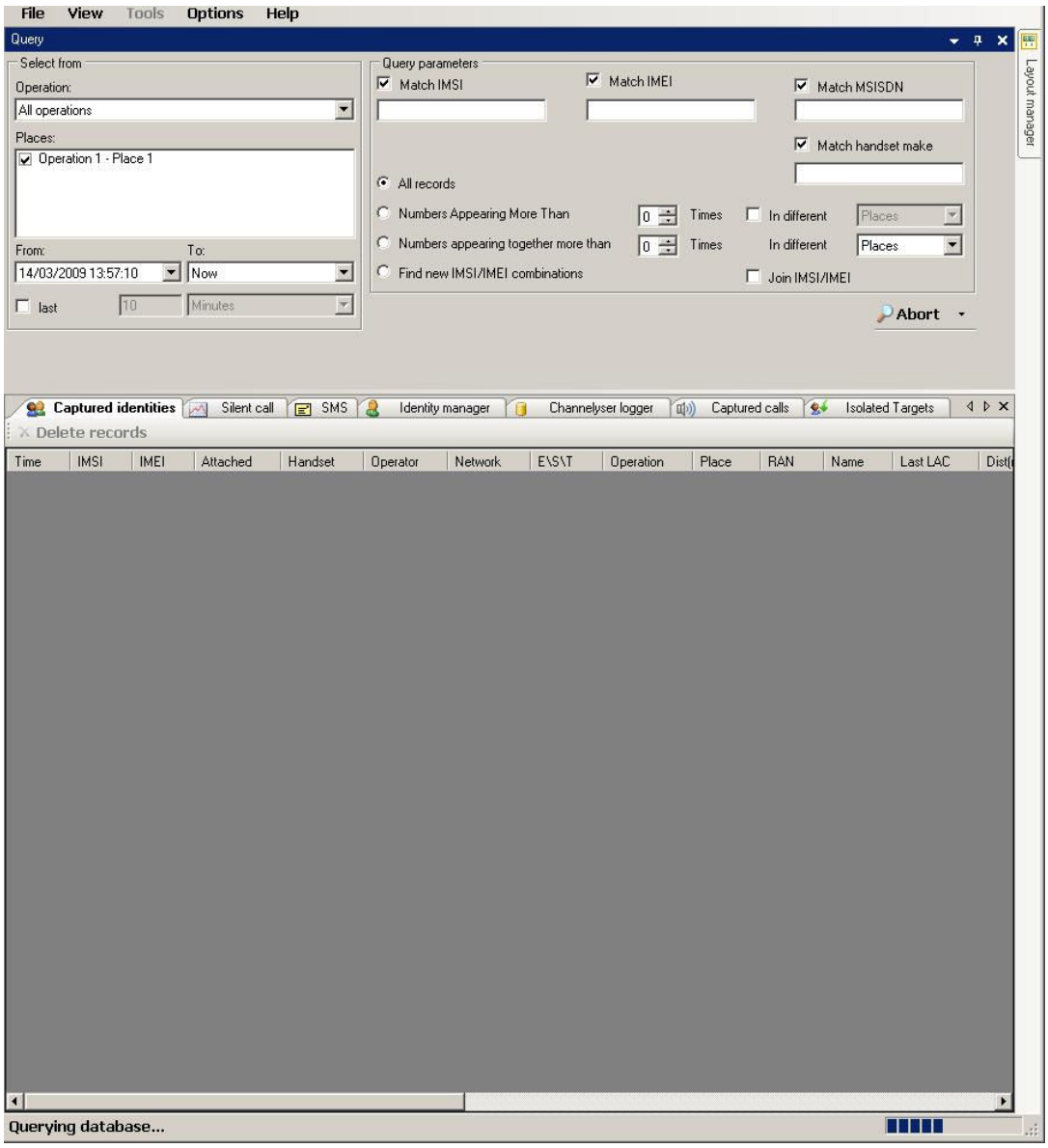


Figure 4-1: Back Office

To retrieve data, simply specify the time/date range and operation/session base and click the Search button. A progress bar shows the progress of the requested data analysis query.

It is possible to select which data types are searched by using the drop down display next to the 'Search' Button.

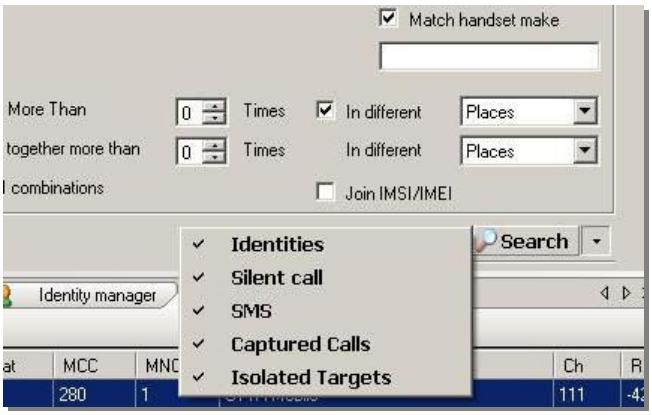


Figure 4-2: Back Office - Search

4.2 Select From

The Data Manager allows selection on a time basis, operation/session basis or a combination thereof.

When selecting a 'From' date, the Data Manager starts at the 1st second of the selected date and the 'To' date relates to the last second of the selected date.

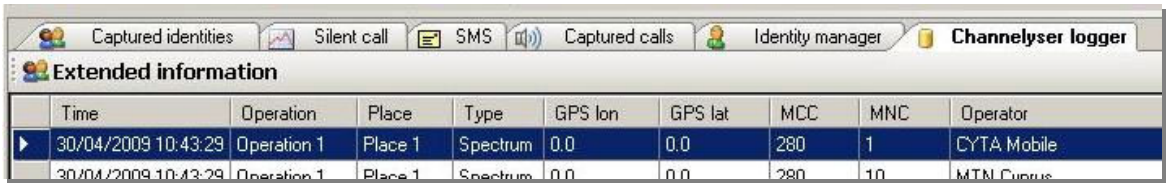
The Session box allows selection or de-selection of specific operations or sessions from the search criteria.

Alternatively, the user may specify the identities received during last X minutes instead of any specific date range.

As shown below, the following sets of data are displayed.

Captured Calls can be played directly from the Back Office

Historical Channelyser Logs can be viewed



4.3 Find

In the Find group of controls, you may define the exact search function you wish to apply to the selected operation/session/date range defined in the 'Select From' control group ("Selected Range").

a. **All Records**: Retrieves and displays all records gathered within the Selected Range. For searches for silent calls this is the only available option.

b. **Find Specific IMSI**: Retrieves and displays all records gathered within the Selected Range, where the IMSI has the defined IMSI or IMSI pattern (specified with SQL wildcards). This enables finding identities, whose SIM card was issued in a specific country or a specific network operator. It is therefore possible to find all identities, whose SIM card was issued by Spain's Vodafone-Airtel, by searching for 21401%. This filter can be used together with other filters.

f. **Find Specific IMEI**: Retrieves and displays all records gathered within the Selected Range, where the IMEI has the defined IMEI or IMEI pattern. This enables finding identities, whose handset has the defined Type Approval Code (TAC). It is therefore possible to find all identities, whose handset is Motorola V66 by entering 350642%. This filter can be used together with other filters.

g. **Find phone manufacturer**: Retrieves and displays all records gathered within the Selected Range, where the given string is the name of the manufacturer of the phone, or the substring of it. I.e., specifying Nokia will find all the Nokia phones. Specifying Ericsson finds both the Ericsson and Sony-Ericsson phones. This filter can be used together with other filters.

h. **Numbers Appearing More than X Times (Cross-Check)**: Retrieves and displays all records gathered more than __ times within the Selected Range so as to enable finding identities captured in different sessions or operations. By cross-checking identity occurrence more than once in different sessions, when following a given target in a different locations, the target's IMSI/IMEI may be extracted. This filter can only be used together with filters 2-4.

i. **Numbers Appearing Together More than X Times**: Retrieves and displays all records gathered within the Selected Range, where a number of identities have been captured together in different sessions or operation. This search enables determination of possible relationships between targets and other people captured together with them (e.g., a target and its bodyguard). This filter can only be used together with filters 2-4.

j. **Find New IMSI/IMEI Combinations**: Retrieves and displays all records gathered within the Selected Range, where the IMSI or IMEI has been changed. This may indicate a situation where a target has replaced its SIM card, while using the same handset or a target inserting its SIM card into a new handset. This filter can only be used together with filters 2-4.

4.4 Search Results

The search results are displayed in several tabs, depending on the type of the recorded action.

The displayed search results include the following data:

a. **Date/Time**: The time-stamp indicating when the record was captured.
b. **IMSI**: The IMSI number of the captured phone.
c. **IMEI**: The handset serial number of the captured phone.
d. **Attached**: Shows if the identity was actually attached to the System.
e. **Operator**: The country and network operator name, the captured phone's SIM card was issued by.
f. **Handset**: The manufacturer and phone model of the captured phone, based on the IMEI's type approval code.
g. **Network**: The network used by the Engage Gi2 System when capturing the record.
h. **Last LAC** – As reported by the captured Handset
i. **Dist(m)** – Approximate distance to Handset in Meters
j. **Operation**: The name of the operation, as entered on the Manager during interrogation.
k. **Place**: The place of interrogation, as entered on the Manager.
l. **Type**: For Silent Call, SDCCH or TCH.
m. **Channel**: For Silent Call, Channel Used.
n. **Power**: For Silent Call, Set Handset Tx Power (5...39 or 0...36).
o. **Timeslot**: For Silent Call, Set Timeslot (0....7).
p. **Receiver MSISDN**: For SMS, assigned Telephone Number.
q. **Sender IMSI**: For SMS, assigned MSISDN.
r. **Acknowledgment**: For SMS, Sent Status.
s. **Sent Message**: For SMS, Forward (manipulated) message.
t. **E/S/T**: Indicates IMEI or IMSI match to an identity defined in the Identity Manager. TMSI for Phone Correlator Only
u. **RAN**: The name of the RAN used for capture.
v. **Name**: The name defined for this identity in the Identity Log, where applicable.
w. **MSISDN**: The Telephone number, as defined manually for this identity in the Identity Log, where applicable.
x. **Notes**: Any note attributed to this identity in the Identity Log, where applicable.
y. **Join count**: The number of occurrences joined together if the Join IMSI/IMEI checkbox is checked.
z. **TMSI**: The TMSI used by the mobile to identify itself.
aa. **A5/1 A5/2** – Ciphering mode as reported by Handset
bb. **Rx level(dBm)** – Signal strength of the system as reported by the handset
cc. **GPS Data**: The coordinates of the capture, and the GPS strings.
dd. **(U)ARFCN** – Channel used for the Capture of the Handset

Any retrieved record, matching an identity record in the Identity Log, is displayed in a different colour, thereby indicating the capturing of a known identity.

4.5 File Menu

I. Refresh

Read the database again and execute the query on that new database

This is useful when Back office is opened in the background, while the Manager is capturing phones.
It enables the user the refresh the results according to the new captured data

II. Select Database

III. Exit

Exit the application

4.6 View Menu

The View Menu allows the user to switch between different available windows.

4.7 Tools Menu

I. Export database

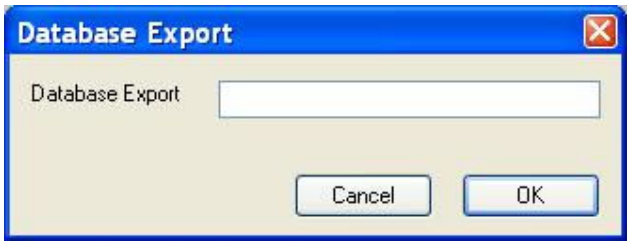
This function exports the entire database.
(Basically used for backup purposes)

Only database name should be set.

The database will be exported to the MySQL folder under the data folder

(i.e. C:\Program Files\MySQL\MySQL Server 5.0\data\Backup)

The backup database can then be copied to any destination



II. Import and Merge Database

This function imports a selected SQL database and merges it into the current SQL database.
This feature is useful to merge an archived database into the current one.

III. Import and Merge Access Database

This function imports a selected Access database and merges it into the current SQL database

This is a backward compatibility feature which enables to import old format database into the existing format

IV. Export

This function exports the query result information related to that specific set of data.

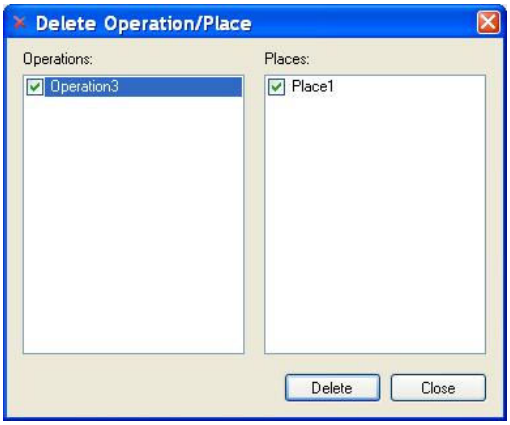
V. Optimise Database

This function compacts and organizes the database, making it smaller and faster.

This is mostly effective after long period of usage and after deleting records.

VI. Delete Operation/Place

Enables to delete a specific operation of place(s) in specific operation



VII. Help -> About

Displays version and license information.

5 Appendices

5.1 Quick Main Menu Guide

File->Exit

For proper Exit from Manager.

View Menu

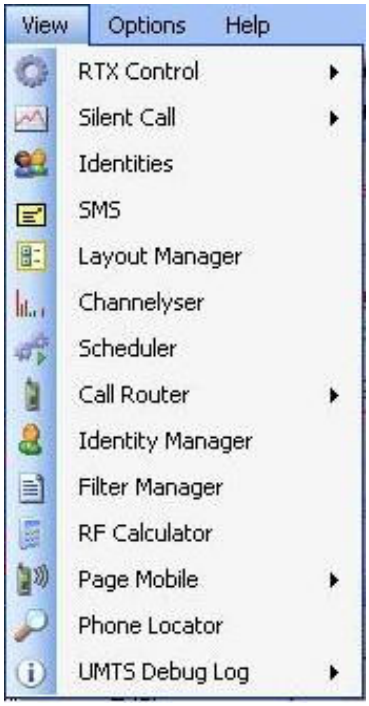


Figure 5-1.1: View Menu

RTX Control: the user is able to select the RTX Controls they wish to view

Silent Call: opens the desired Silent Call window (distinctive by RAN)

Identities: view the Identities grid

SMS: view the SMS grid

Layout Manager: view the Layout Manager

Channelyser: enables the Channelyser view

Scheduler: displays the Scheduler window

Call Router: can access either the Call Router Manager

Identity Manager: displays the Identity Manager window that can be used to Add/Edit/Delete or Import identities

Filter Manager: opens the White List/Black List interfaces

RF Calculator: a tool used for calculating the RF of a specific channel, Up Link and Down Link, as well as the reverse operation. Introducing exact RF data, calculates the channel

Page Mobile: Checking that the target Phone is still connected to our network and has not returned to the commercial Network (Checks Rx Level).

Phone Locator: Determines the TMSI from the MSISDN.

Channelyser Log: Opens the Channelyser Log Viewer. From this interface you can view the results of a particular Scan.

Options Menu

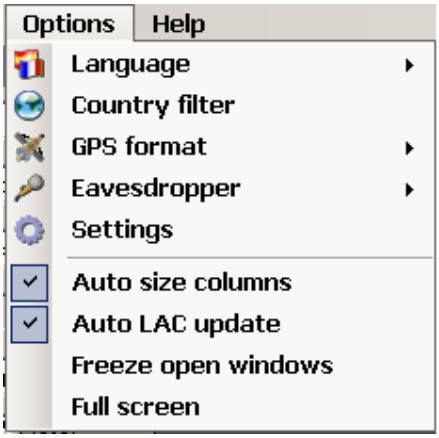


Figure 5-1.2: Options Menu

Language: The user interface is multi-lingual

In order to change language (currently available English, French, Spanish and Russian), go to "Tools" -> "Language" and choose the desired language.

Country Filter: allows the user to select the country/countries that will be used to populate the operator list in the pre-set form.

Figure 5-1.3: Country Filter

GPS Format: Changes the Units in which the GPS results are displayed

DMS, Decimal (WGS84), GPS (RMC, GGA) Formats.

Eavesdropper Settings: detailed description given elsewhere

Settings – See below*

Auto SMS Settings: detailed description given elsewhere

Auto Size Columns: can be ON or OFF

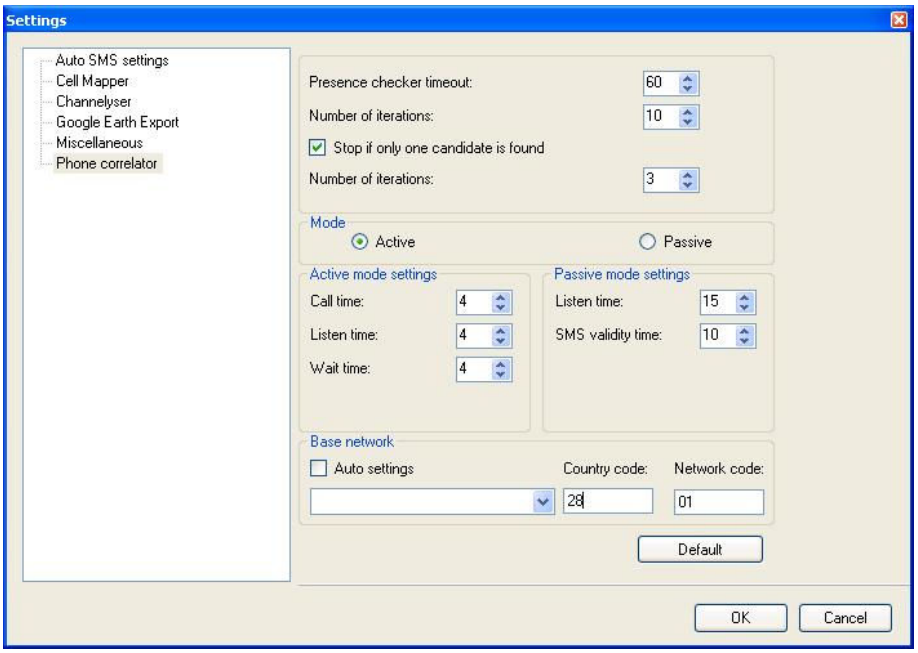
Auto LAC Update: Automatically changes the LAC each time a Transmission is sent. (I.e. each time 'Transmit' is pushed)

Freeze Open Windows: Locks in place the currently opened windows. They can no longer be moved, only opened and closed.

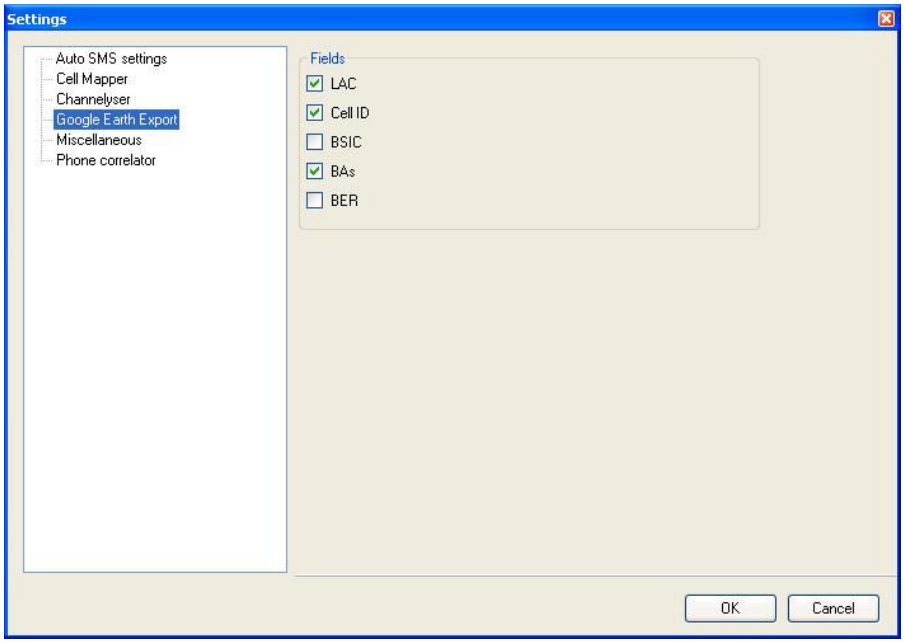
Full Screen – switches the view to full screen. I.e. without the Software header or Windows Taskbar.

*** Settings Menu**

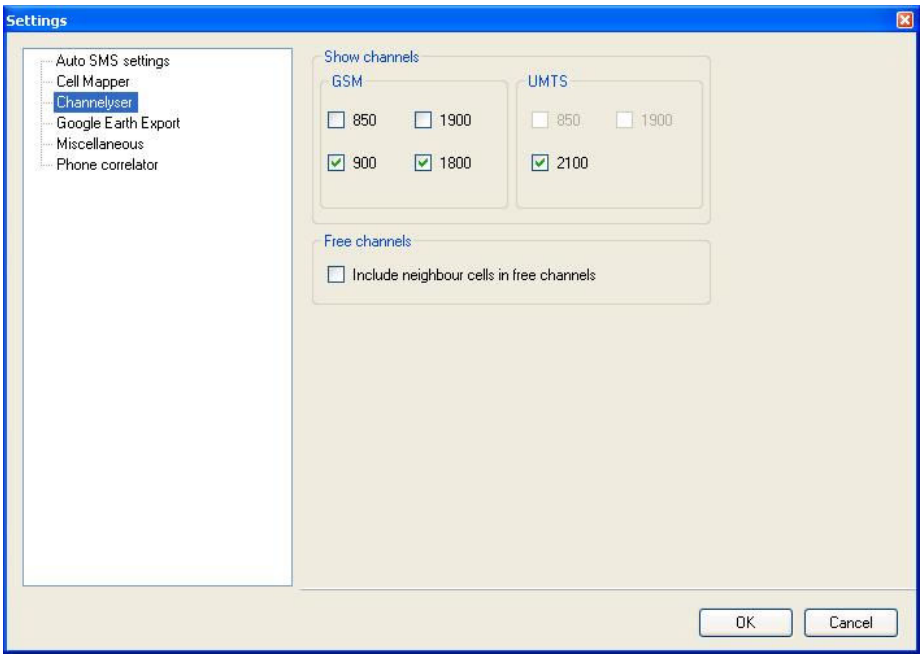
Phone Correlator – Defines settings as described in the Phone Correlator section



Google Earth Export – defines what parameters are to be exported when creating the .kmz file for viewing of channelyser results using Google Earth

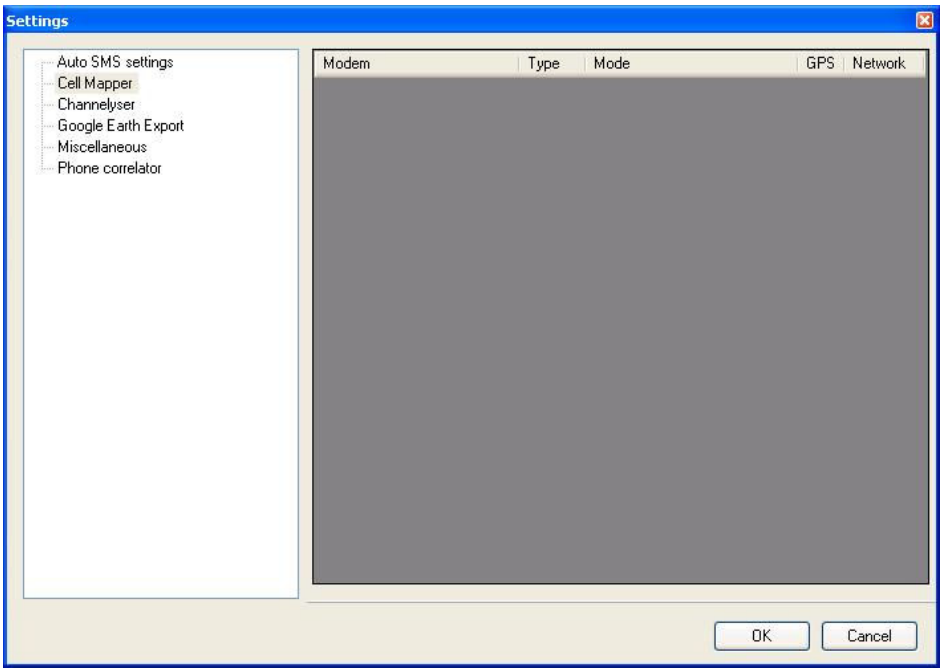


Channelyser – defines the Graphs of which Bands are to be shown in the Channelyser window

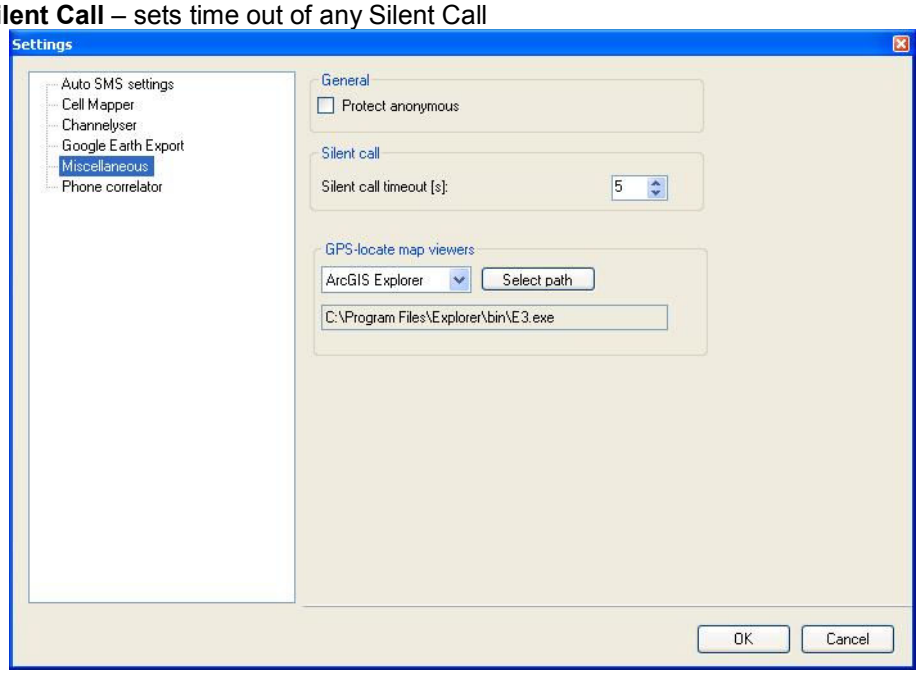


Free Channels – once a Channelyser scan is run a set of free channels can be added to the RTX Control (Channelyser window). In addition, by selecting this option, the real neighbour cells of the selected channel will also be added to the RTX Control neighbour list.

Cell Mapper – defines which modem is to be used for the acquisition of GPS data.



Miscellaneous
Protect anonymous – see dedicated section
Silent Call – sets time out of any Silent Call



Auto SMS Settings – See Auto SMS Section

Help->About

Displays version and licence related information.

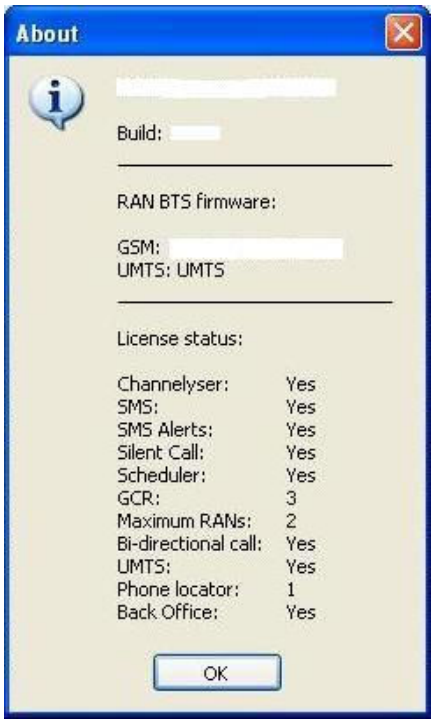


Figure 5-1.4: About Menu

5.2 Appendix 2 – Identity Manger – Import Functionality

The import file is a regular CSV file with a header. The header defines order of identity properties. The following property names can be used in the header: ID, Name, IMSI, IMEI, Notes, SMS, Audio, Picture, AutoClone and Colour. All the properties are optional, except Name and IMSI or IMEI. If the header does not include a property name, the property is empty for all records. Each record defines a new or updates an existing identity.

The properties should comply with the following rules:

a. ID - Property is a number or an empty string. If it is a number and the identity with the ID exists, the properties of the existing identity which are not empty in the record are updated. If the property is empty or the identity with the ID does not exist, a new identity is created based on the properties in the record.

b. Name - Property is a string. It can be empty only if the record updates identity.

c. IMSI - Property is a number with at most 15 digits. It can be empty if IMEI is not empty or the record updates identity.

d. IMEI - Property is a number with at most 15 digits. It can be empty if IMSI is not empty or the record updates identity.

e. Notes - Property is a string. It can be empty.

f. SMS - Property is a phone number. It can be empty.

g. Audio - Property is a path to a wave file. It can be empty. The path can be absolute or relative to the location of import file. The file must exist.

h. Picture - Property is a path to an image file. It can be empty. The path can be absolute or relative to the location of import file. The file must exist.

i. Auto Clone - Property is a Boolean. It can be Yes, True or 1 for true or anything else for false.

j. Colour - Property is a colour in html hex format (for example #00FF00) or html colour name (http://www.w3schools.com/html/html_colornames.asp). It can be empty.

Example 1:

```
Name, IMSI, Audio
Bill, 1111
George, 1222, c:\george.wav
```

Example 2:

```
Name, IMSI, IMEI, Picture, Audio, SMS, AutoClone, Colour
George, 1222,34243233, george.jpg, george.wav,, Yes, DarkBlue
Al, 2134333321,,,..\..\al.wav, 999999, Yes, #FF0000
```

5.3 Appendix 3 – Wireless LAN (VNC) Configuration (Opt.)

5.3.1 Initial Network Set-up - Laptop

On the Engage Gi2 System Laptop the Wireless LAN configuration must include the following IP settings:

d. Click the Start menu and then move the mouse over Connect To - Wireless Network Connection. While the mouse is over "Wireless Network Connection", right-click and select "Properties".

e. Scroll-down the items in the list box and double-click the Internet Protocol (TCP/IP) item.

f. Check the "Use the following IP address and enter the IP address 192.168.2.1 Subnet mask 255.255.255.0 then click OK.

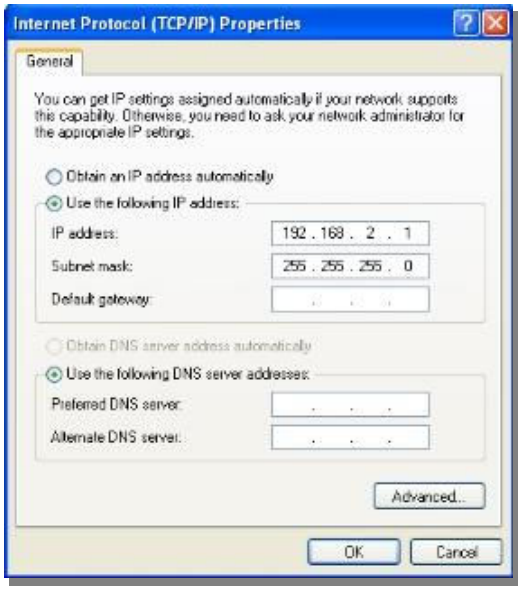


Figure 5-3.1: Laptop TCP/IP Settings

g. Select the "Wireless Networks" tab, check the checkbox labelled "Use Windows to configure my wireless network settings.

h. Click the "Add" button to add a new preferred network.

i. In the Network name (SSID) textbox enter "System Name".

j. Uncheck the "Data encryption (WEP enabled)" checkbox and click OK.

k. Click the "Advanced" button on the bottom-right of the window and select "Computer-to-computer (ad-hoc) networks only and then click the "Close" button.

l. In the "Advanced" tab under Windows Firewall, verify that the Wireless network Connection checkbox is unchecked (disabled).

5.3.2 Initial Network Set-up - PDA

a. Start -> Settings -> Connections -> HP iPAQ Wireless

Click View Wireless LAN Networks

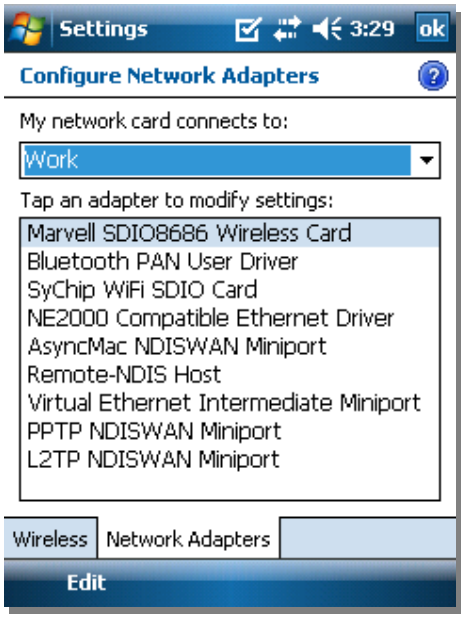


Figure 5-3.2: PDA Wireless Card Settings

Select -> Work and -> Marvell Wireless Card

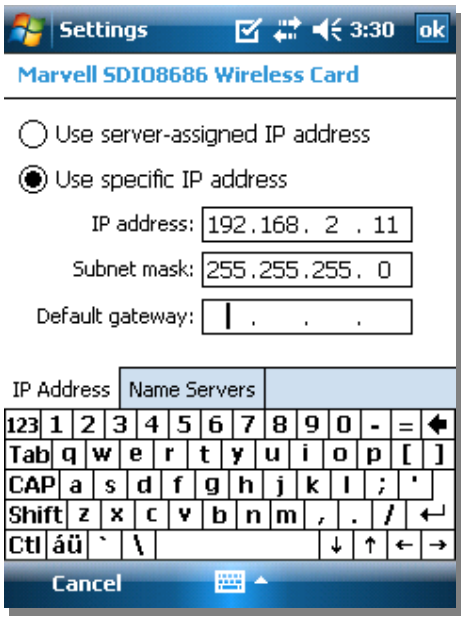


Figure 5-3.3: PDA IP Settings

b. Enter the IP addresses as above.

Select -> Ok (Top Right)

Select -> Ok Again

c. Select WLAN to turn it on as below ensuring you select the network to connect to.

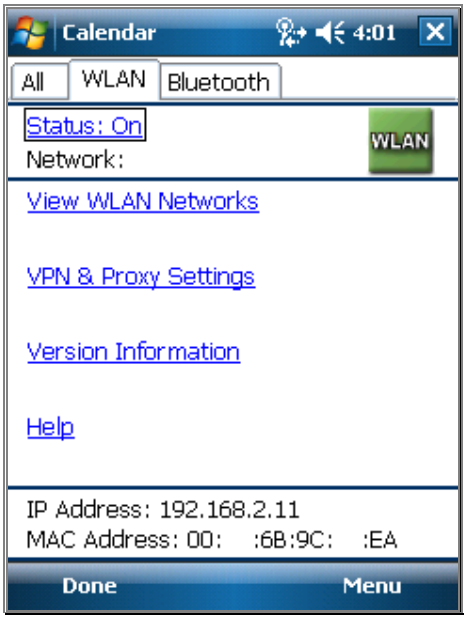


Figure 5-3.4: PDA Enable WLAN

d. Select the appropriate Network if necessary.

Figure 5-3.5: PDA Connecting to Network

e. On the Engage Gi2 System Laptop goto Start -> Settings -> Network Connections.

Double Click Wireless Network Connections, Search for the network -> Connect to that network.

f. Ensure the Engage Gi2 System Laptop can see the PDA by pinging it.

Start -> Run -> CMD -> ping 192.168.2.11

Figure 5-3.6: Laptop Connection Confirmation

You may see three possible reply schemes:

I. `Reply from 192.168.2.11: …`
   The wireless LAN connection is working properly.

II. `Destination host unreachable.`
   The wireless LAN interface is not recognized by the laptop. Verify that the wireless LAN interface is properly configured and active on the laptop.

III. `Waiting for reply`

The wireless LAN interface is configured and operating but there is no reply from the handheld PDA. Possible reasons: PDA out of range, PDA wireless LAN switched off, incorrect configuration of the PDA, etc.

5.3.3 VNC Operation

The Engage Gi2 System uses Virtual Network Computing (VNC) to enable the handheld PDA control over the System laptop while the case is closed.

When operating the System directly from the laptop console, the VNC environment is not used.

VNC is remote control software which allows the user to view and interact with the System laptop (the “server”) using a simple program (the “viewer”) installed on the handheld PDA, via the TCP/IP wireless LAN connection.

The VNC server software is pre-installed on the System laptop and the handheld PDA has a pre-installed version of VNC for the Pocket PC operating system.

a. On the System Laptop open the VNC Server Application (if not already open)

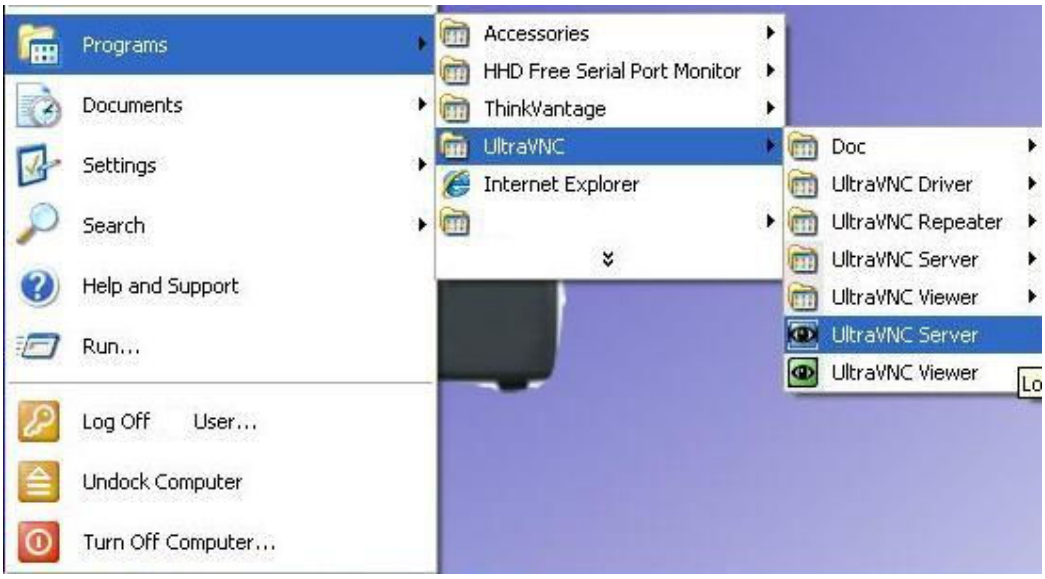


Figure 5-3.3.1: Laptop Starting VNC

b. Go to -> Properties and assign any Password.

Check the Display box and enter 0 (Zero)

Apply these changes.

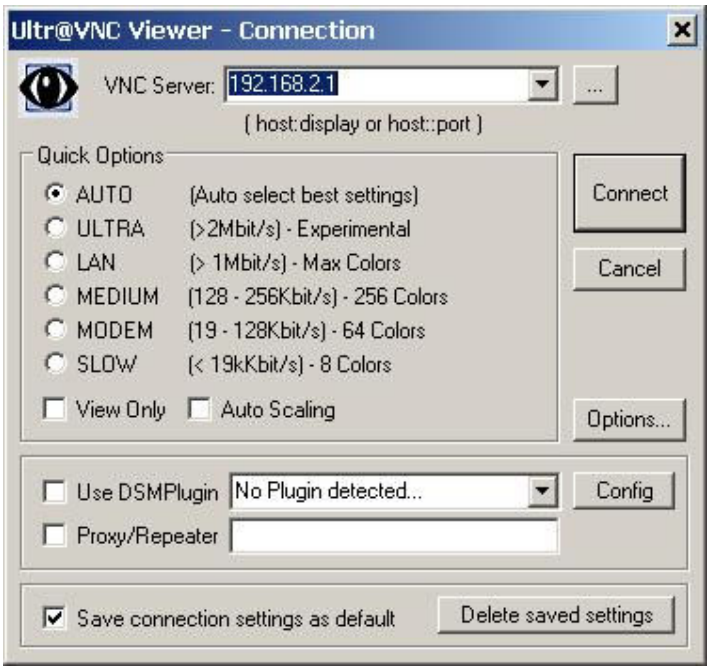


Figure 5-3.3.2: Laptop modifying VNC Properties

c. On the PDA Start the Application VNCViewer

Start -> vncviewer

Enter the IP address of the Laptop (as entered above, 192.168.2.1) followed by a colon (:) followed by the port assigned above (probably 0).

Enter the Password as entered above.

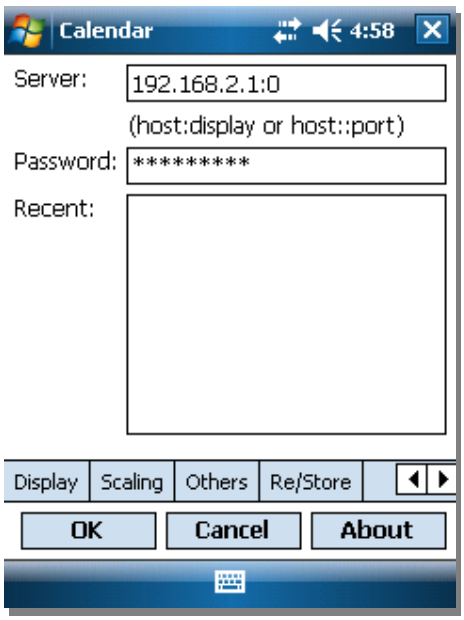


Figure 5-3.3.3: PDA Connecting to VNC

The Viewer will start.

Note that the Manager has a mode for easy viewing on the PDA.

d. Go to the Layout Manager and Select PDA.

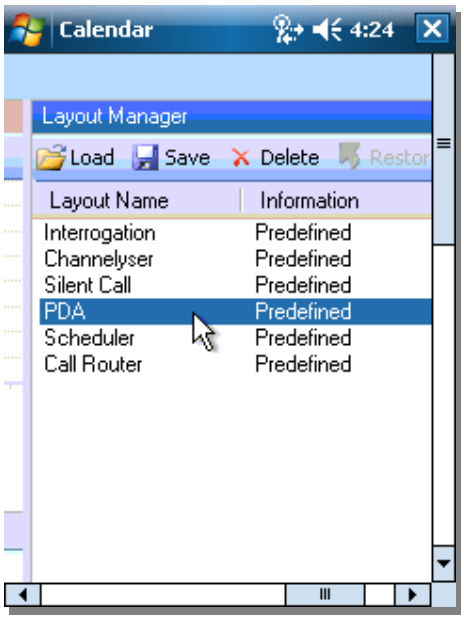


Figure 5-3.3.4: PDA Changing View

This will resize the Window. Now scroll across to view the Parameters.

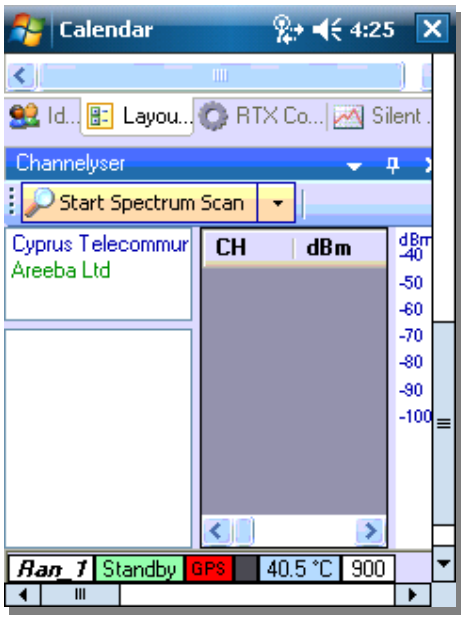


Figure 5-3.3.5: PDA Control of Manager

5.3.4 Restoring VNC Viewer on the Handheld PDA

VNC viewer software may be erased from the handheld PDA due to power failure.

If a copy of the VNC software is available on the SD backup card, follow the procedure below:

a. Verify that the SD Card with the VNC software is inserted into the PDA.
b. Tap Start - Programs - File Explorer.
c. Tap My Documents and then select My Device.
d. Tap SD Card.
e. Hold the stylus over the vncview text until the pop-up menu appears and then select Copy.
f. Tap SD Card
g. Tap My Device
h. Tap Windows
i. Tap Start Menu
j. At the bottom of the Start Menu, hold the stylus on a blank area until the pop-up menu appears and select Paste. The vncview program (106K) should appear.
k. Close the File Explorer.
l. To start VNC on the PDA tap Start - Programs and scroll down to tap the vncview icon.

Alternatively, a backup executable file for the PDA is also located on the laptop under C:\Program Files\RealVNC\vncview.exe and may be reloaded onto the PDA via the infra-red connection.

In order to reload VNC viewer onto the PDA, mount the PDA near the laptop's infra-red port. The laptop's system information tray should indicate a new connection with the PDA.

By using the Windows Explorer, open C:\Program Files\RealVNC\, right-click vncview.exe and select Send To Infrared Recipient

Once the transfer is complete, click Yes on the PDA to confirm acceptance of the VNC viewer file

Start => Programs => File Explorer => My Device => My Documents

Cut vncview and paste it to My Device\Windows\Start Menu.

The vncview icon should now appear when tapping the Start menu.

5.4 Appendix 4 - Power Amplifier (Opt.)

Introduction

The purpose of the power amplifier is to extend the effective communication range between the Engage Gi2 System and the target mobile phones. The power amplifier enables easy operation of the System from within a car by using a magnetic base car antenna or external directional antenna.

The Unit can be used with one of 3 types of antennas or a combination thereof:

I. The Internal Antennas enclosed within the Engage Gi2 System itself

II. External Passive Antennas

III. External Power Amplifier

5.4.1 PA Operating Instructions

a. Ensure the Manager is in Standby and not Transmitting

b. The main unit has embedded flat panel directional antennas – an antenna for each of the frequency bands that your Engage Gi2 System can broadcast on is configured for transmission and reception.

c. External Passive antennas can be connected to both the Rx and Tx ports of your Engage Gi2 System in order to improve the reception and transmission range.

   In the case that you want to connect Passive Antennas it is necessary to unscrew the connectors used by the Antennas in the lid of the Unit.

d. When using the External Power Amplifier caution must be taken to ensure that the correct connections are established between the System and the PA.

   Labels are added to each Unit to indicate which ports are to be used to connect to the PA.

e. It is recommended to connect the PA in the following manner.

   Identify the Tx port, on the Engage Gi2 System, for a particular Band, e.g. 900 Tx, connect this port to the Rf Input port of the same Band on the PA. Repeat this for process for each Band for which the System and PA are configured. (Note, you may want to amplify only one particular Band, in which case use only that particular connection)

f. Connect the external Antenna to the Rf Output Port of the PA. Repeat this process for each Band on which you want to have an amplified transmission.

g. If your PA has Rx Inputs then you can connect the Rx Port of the System to the PA. This can be repeated for each Band.

   Note: It is possible and is an accepted configuration that the Tx is amplified using the PA whilst the Rx uses External Passive Antennas or the Internal Antennas of the System.

h. Switch on the Main PA switch, if the PA has individual Switches for each Band then enable the switch for the Band on which you wish to transmit.

   Note: the PA Battery life can be prolonged by enabling only the particular band for which you need to transmit.

i. The System is now ready to transmit.

   Note: ALWAYS go to Standby on the Manager before powering off the PA as failure to do so may damage the PA.

5.5 Appendix 5 – TAC Database Update

For Units under Warranty a TAC Database will be periodically made available.

The Type Approval Code (TAC) Database translates the IMEI Number of a MS into easily recognisable Makes and Models.

e.g. IMEI 35268302558709 = Sony Ericsson W910i

To update the TAC database use the following procedure. Note that a Database update is only possible on versions later than v25.16.33.

a. Copy the provided Folder containing the Database files to a USB Stick.

b. Close the Manager.

c. Open Back Office.

d. From the menu, select *Tools->Import and Merge Database* and browse to the Folder, containing the Database files, on the memory stick.

e. It will take a minute or so to import the database.

f. 'Database Import Completed Successfully' will be displayed in the status bar.

g. Reopen Manager – Makes and Models of Captured phones will be updated.

5.6 Appendix 6 – Software Installation

5.6.1 Precautions

The Engage Gi2 System is shipped from the factory with the software pre-installed and the system components correctly configured.

In the following instances it may be required to re-install or upgrade the System operating software.

- Upgrade to a later version of Manager.
- Re-install of Manager due to file corruption or PC problems.
- Changes to the hardware configuration necessitating a software re-install.

Note: This cannot be undone – it recommended that all configuration settings are recorded before Software Removal.

The Audio Calls, Database, Layouts and Configuration files are NOT deleted when the Application Software is removed, nor is the License nor the RAN Config.

Caution: If the Manager Suite is upgraded to a new Major Version[5] then a new user License is required.

5.6.2 Database Backup

The Database backup is performed using the Tools Function of the Back Office

I. To Export the Database go to Back Office and select Tools - > 'Export Database'.

II. To Import the Database go to Back Office and select Tools - > 'Import and Merge Database'.

The following Tables ARE Imported/Exported as of v38

1. Transmission Log (Log of transmissions)
2. Transmission Settings (RTX Control settings each time we started transmission)
3. Capture_Log (Captured mobiles)
4. Presets (Presets used in RTX controls)
5. Preset_Neighbours (Part of Presets)
6. SMS_Capture (Captured SMSs)
7. SMS_Send (Fake SMSs)
8. Silent_Call (Log of when silent calls were started and stopped)
9. ID_Log (ID Manager info)
10. Whitelist (Part of ID Manager)
11. Black list (Part of ID Manager)
12. Target (Part of ID Manager)
13. Id_groups (Part of ID Manager)
14. Notifying_contacts (Part of ID Manager)
15. Networks_Scan_History (Channelyser Logger)

[5] Version number are presented in the following format XX.XX.YY, a major change would be if any X value is different to the current version installed.

16. Networks_Scan_History_Opr (Channelyser Logger)
17. Networks_Scan_History_Details (Channelyser Logger)
18. Call_Capture (Captured calls with recorded audio)
19. DTMFs (DTMFs of captured calls)
20. Countries
21. Networks (Operator list)
22. Handset (Handset / TAC list)
23. imsi_msisdn (saved sim cards msisdns)

Summary of notable aspects that are not imported:

1. RAN Configuration (everything that is configured in RAN Config)
2. Scheduler
3. GCR

5.6.3 Software Removal

a. Open the RanCfg tool in order to view each of the RAN's parameters.

Start -> Programs -> 'System Type' -> RanCfg

Note: Ranconfig is password protected in order to avoid any possible mis-configurations that may cause damage to the Unit or any Accessories.

b. note down the following parameters for each RAN:

BTS IP

BTS Band

c. To remove the Software go to: Start -> Programs -> 'System Type' -> Uninstall.

d. At the Confirmation Dialog click 'Ok'

e. Uninstall current version
Start -> Programs -> 'System Type' ->Uninstall

f. This will uninstall:
BackOffice

GCR

Manager

RanCfg

MySql

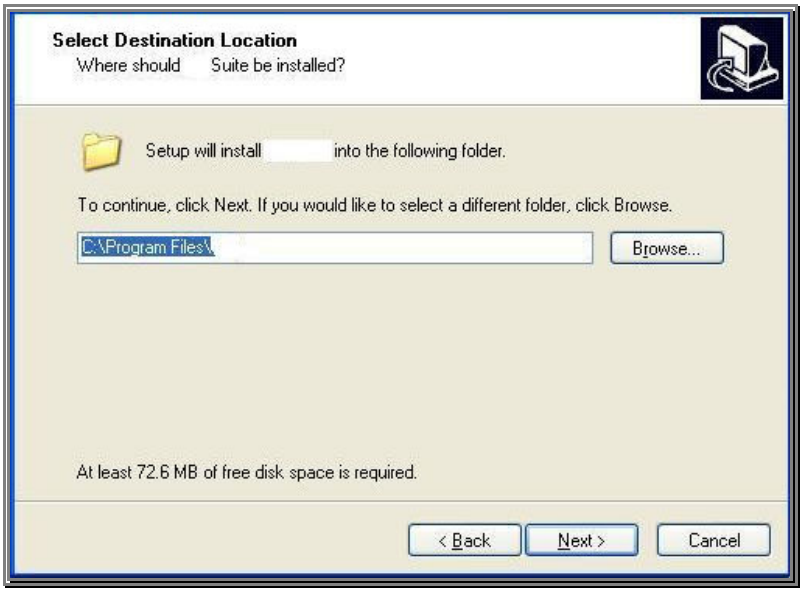
g. Note that Uninstall operation will not delete the System Directory and MySql Directory under Program Files (the last one will keep only the System database).

5.6.4 Software Installation

a. If a previous version exists uninstall it first.

b. Double click the 'Setup Version xx.yy.zz.exe" file provided to you.

c. Select 'Next'



d. Leave the Destination as default. Select 'Next'

If the *Folder Exists* message window pops up if previous version was installed on the computer and the System directory was not removed manually.

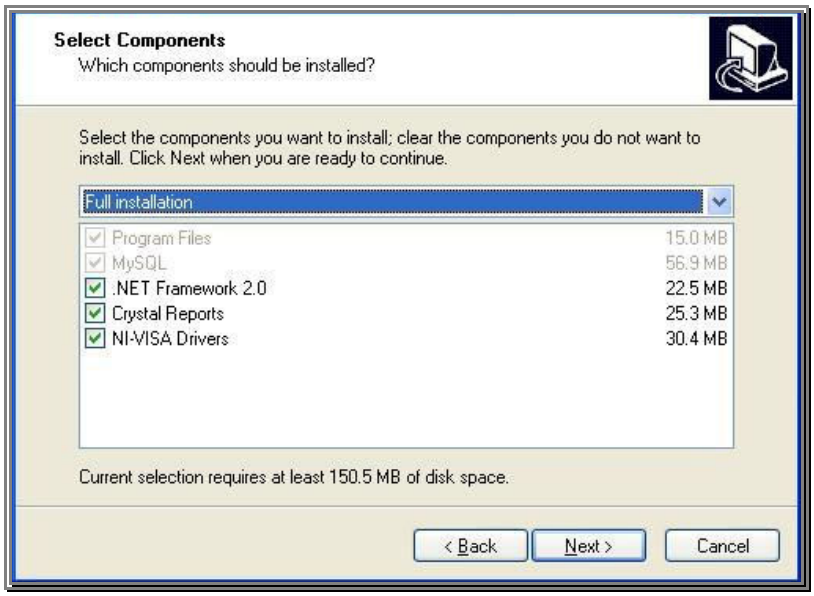
e. Select 'Next'

Components that might already exist, from previous installations, can be unchecked.

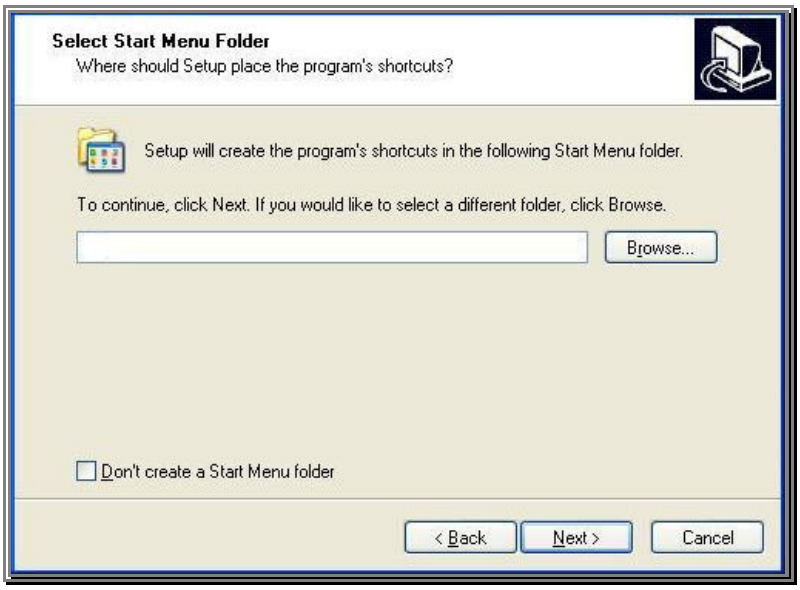
.NET Framework 2.0

Crystal Reports

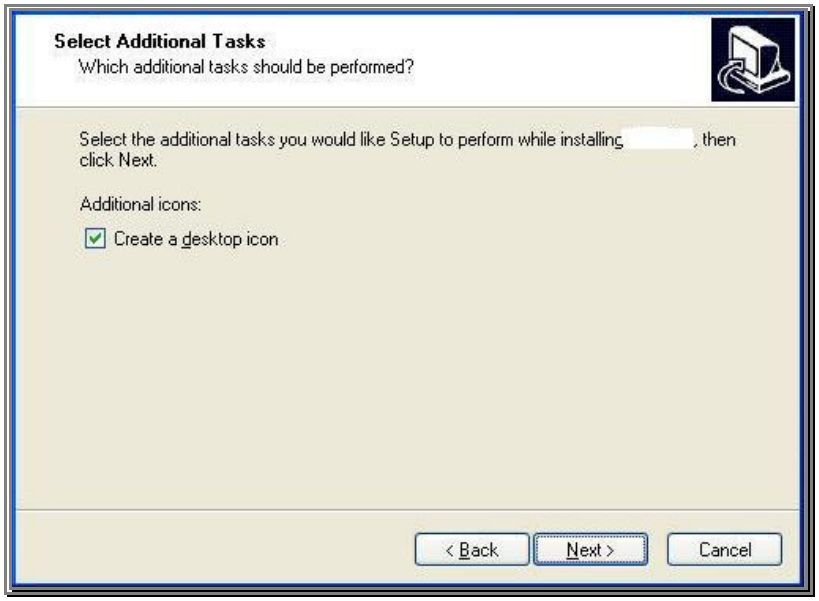
NI-VISA Drivers



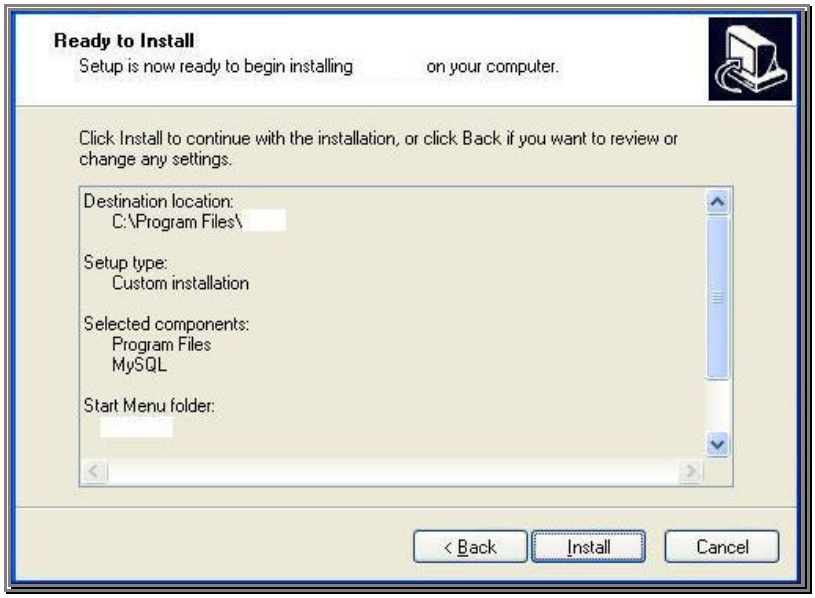
f. Select ‘Next’



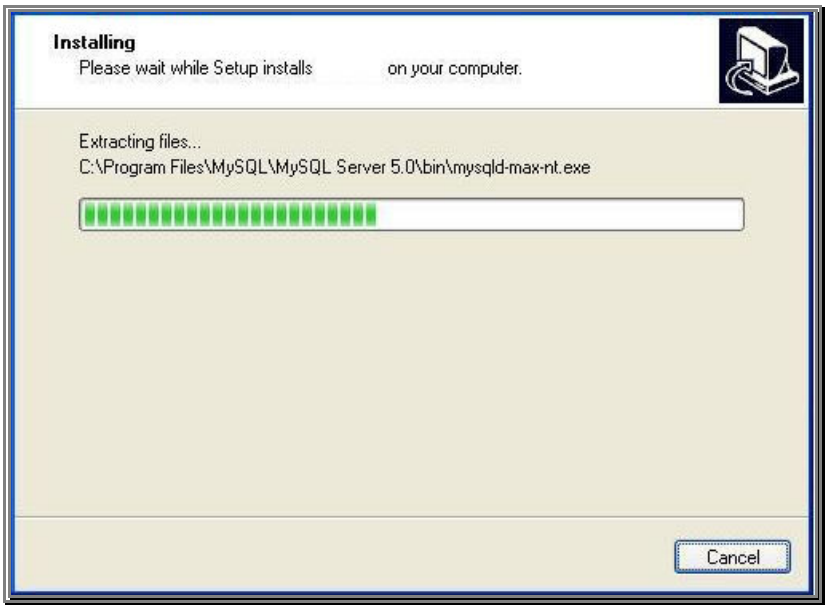
g. Select ‘Next’



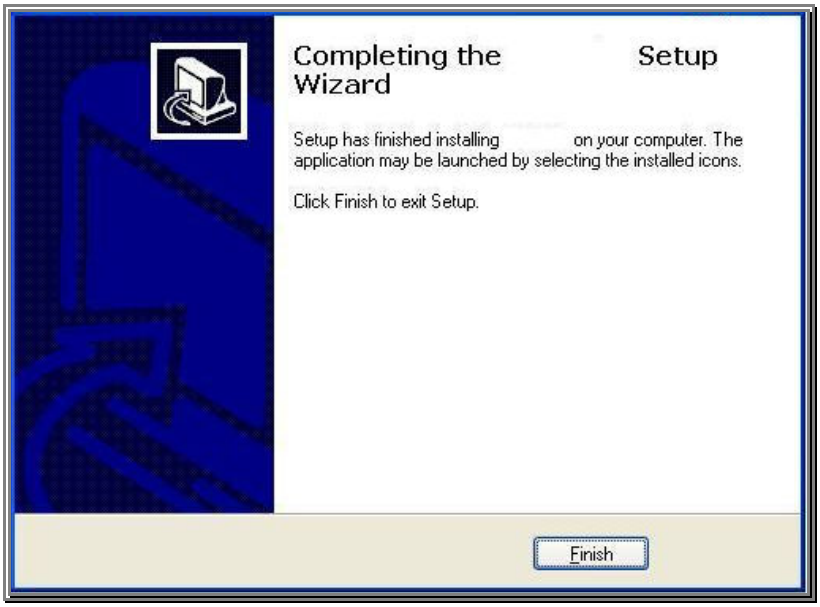
h. Select ‘Next’



i. Select ‘Install’



j. Wait until the installation completes

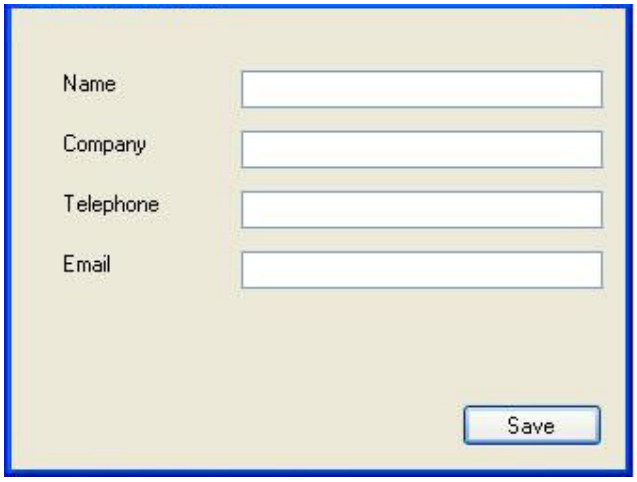


k. Select Finish

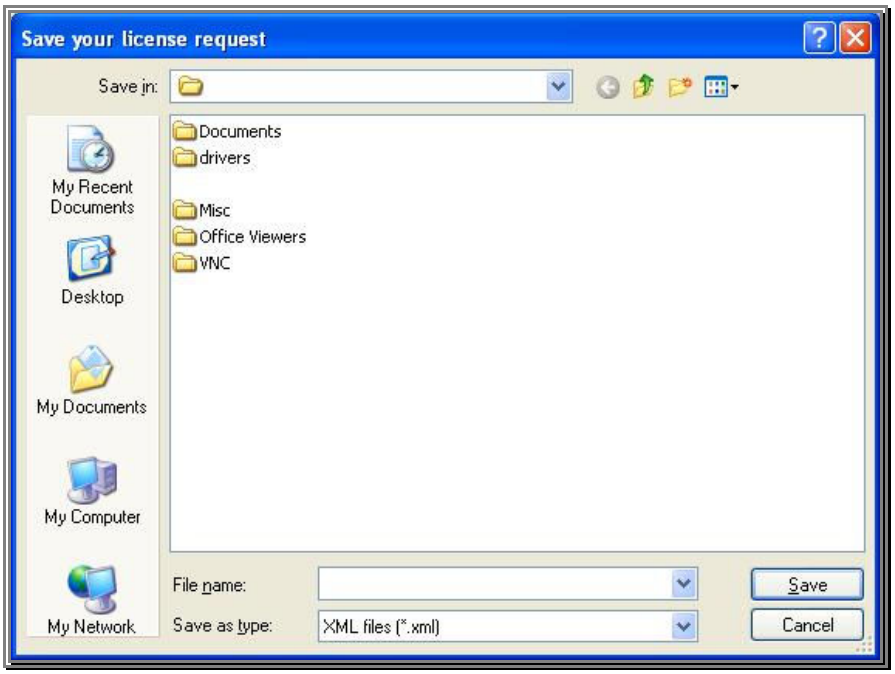
5.7 Appendix 7 – Licensing

A separate license is provided for each of the Engage Gi2 System software optional components. Each component is licensed for use on the specific notebook PC of each System. In addition each installation is licensed for a specific number of RAN's corresponding to the BTS's installed in hardware.

a. Go to: C:\Program Files\ "System Type"\LicenseRequest.exe.



b. Fill out the Request Details and Save the File.



c. Using a USB stick, copy the saved file and send it by email to the Support Representative

Include the details of the client name and organization, the serial number of the Unit and the required software features to be licensed.

d. The licenses for the purchased software options will be return-emailed as a renamed Windows XP registry file, xxx.reg.

e. Copy this file to the hard drive of the System where the .XML is stored.

f. Rename the extension to .reg..

g. Double click the .reg file to register the licensed software components.

The Manager application may now be run with the licensed features activated.

5.8 Appendix 8 – Back-up and Recovery of Hard Drive

Note: This procedure allows a user to Back-up all data contained on the System Laptop for recovery in the event of a hard disk failure.

This may take up to 2 hours to complete.

Caution: Any data gathered between a back-up and the restoration of data from an earlier time will be lost. Therefore, it is advisable to back-up you data frequently and when restoring use the latest available file.

5.8.1 Hard Disk Back-up

a. Ensure the Engage Gi2 System Laptop is connected to mains power

b. Connect the Hard Disk to which the back –up is to be made.

c. Go to -> Start -> Programs -> ThinkVantage -> Rescue and recovery

Rescue and recover launches

d. Select Back up your Hard Disk

e. Select Preferences

f. Change Primary back up locations to 'USB hard drive'

Select OK

g. Ensure back up your data is selected and add name

Select OK

Select OK at the Rescue and Recovery Warning

h. Select yes to make HD bootable

i. System creates sys disk

Select Ok at prompt (create rescue media)

j. Back up process commences

Note: This may take a few minutes to start!

Select OK upon completion

k. Select Close to Finish the Back-up process.

5.8.2 Hard Disk Recovery

Note: To be performed under the supervision of a Training & Support Engineer

CAUTION: Recovering your Hard Disk will cause you to lose any data gathered since the Back-up.

Note: Restoring the Hard Disk may take up to one hour.

a. Plug the USB Hard Disk into the System Laptop

b. Turn the System Laptop on

c. Once BIOS screen comes up press F12

d. Select -USB HDD and press enter (Wait)

e. Select Restore your system

Select OK past prompt

f. Select ‘Restore my entire hard drive’.

Select next

g. Select USB HD from drop down list

Select the Backed-up File name

Select next

h. Select: I do not want to save any files

Select next

i. Select Do not preserve my windows User ID and password

Select next

Select Ok past prompt (Wait)

j. Once the Restore is finished

Select OK to Reboot

5.9 Appendix 9 – Remote Sessions

Here follows Instructions and precautions on establishing a remote session for the purposes of Support.

5.9.1 Laptop Configuration

The Engage Gi2 System can establish a network link to the Users Internet connection via the LAN or WiFi links. The LAN cable is used for the System’s data connection with the BTSs and it is not recommended to modify the network setup of this connection.

a. Establish a Wifi Connection between the System Laptop and the Users WiFi Access point. Use the network settings as provided by the ISP or Network Administrator.

b. Ensure the Laptop has Windows XP & Service Pack 3 as a minimum. If it does not update the OS immediately

c. Ensure the Windows Firewall is Enabled

d. Install a reliable antivirus software, try not to use trial versions, a reliable, Free and well supported application like ‘AVG’ is recommended.

Once the Connection to the Internet has been established and all safety precautions taken it is then possible to start the Remote Support Session.

e. Go to www.logmein123.com and enter the PIN number as provided by the Customer Support person.

f. Acknowledge the various steps.

g. A Remote Support Session has now been established

Once the Remote session has been ended it is recommended that the System Laptop be disconnected from the Internet and used solely for operational purposes.

5.10 Appendix 10 – Antenna Specifications

5.10.1 External Antennas

Properties	Specification
Frequency range	896-960 MHz
Directivity	Omni-directional
Impedance	50Ω
Gain	3 dBi
Max power CW	50W
Base	Magnetic
Connector	N-type
Polarization	Vertical
Height	80 mm (including magnetic base)
Whip diameter	35 mm

Antenna must be used on a metal ground plane (vehicle roof)

Figure 5-10.1 Omni directional 900Mhz (Short)

Properties	Specification
Frequency range	1800-1990 MHz
Directivity	Omni-directional
Impedance	50Ω
Gain	3 dBi
Max power CW	50W
Base	Magnetic
Connector	N-type
Polarization	Vertical
Height	68 mm (including magnetic base)
Whip diameter	33 mm

Antenna must be used on a metal ground plane (vehicle roof)

Figure 5-10.2 Omni directional 1800Mhz (Short)

Properties	Specification
Frequency range	824-960 MHz
Directivity	Uni-directional
Impedance	50Ω
Gain	8 dBi
3 dB beamwidth horizontal	75°
3 dB beamwidth vertical	70°
Max power CW	75W
Front-to-back ratio	20 dB
Connector	N-type (jack)
Polarization	Vertical
Dimensions	200 x 200 x 43 mm
Weight	0.5 Kg

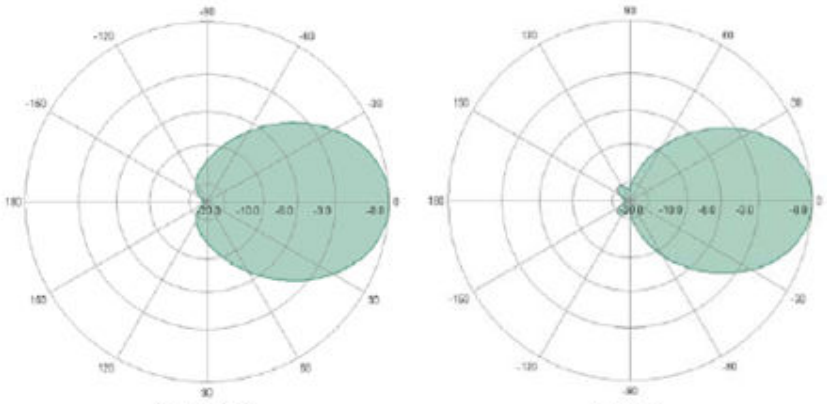
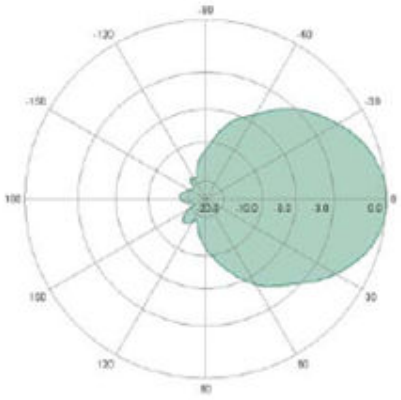
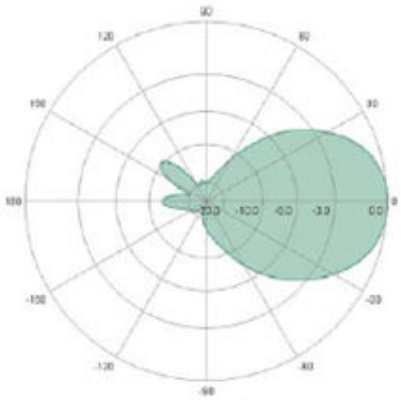


Figure 5-10.3 Uni directional 900Mhz

Properties	Specification
Frequency range	1710-1880 MHz
Directivity	Uni-directional
Impedance	50Ω
Gain	7.5 dBi
3 dB beamwidth horizontal	85°
3 dB beamwidth vertical	60°
Max power CW	75W
Front-to-back ratio	12 dB
Connector	SMA (jack)
Polarization	Vertical
Dimensions	101 x 95 x 32 mm
Weight	0.11 Kg



horizontal



vertical

Figure 5-10.4 Uni directional 1800Mhz

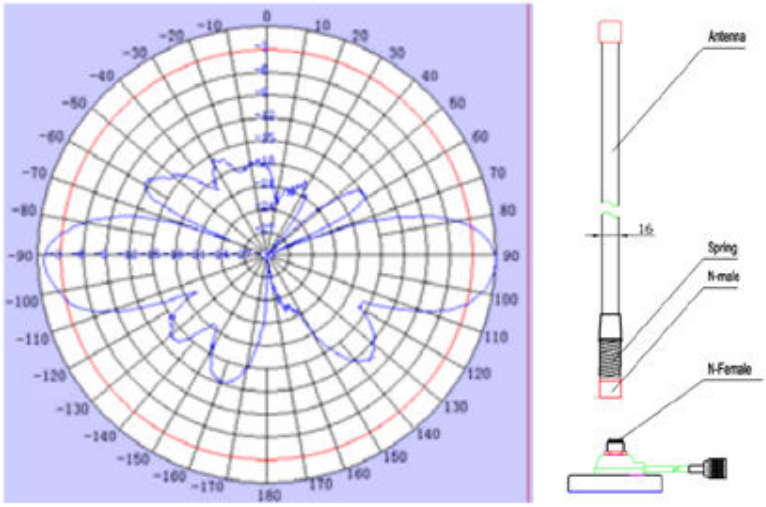
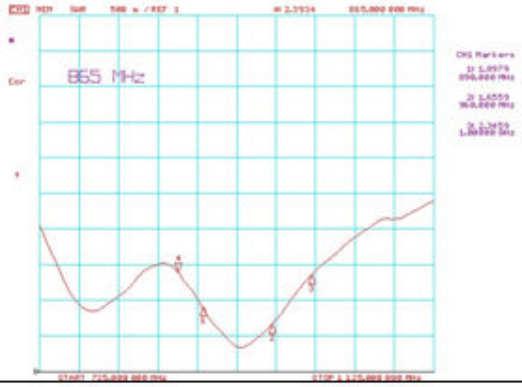
Properties	Specification
Frequency range	890-960 MHz
Directivity	Omni-directional
Impedance	50Ω characteristic
Gain	5 dBi
Max power CW	100W
Type	Dipole (ground independent)
Connector	N-type plug on spring
Polarization	Vertical (nominal)
Material	Fiberglass
Height	51 cm
Weight	250 gr.
Mounting	Magnetic base or bulkhead N-type jack
Image	Elevation radiation pattern (elevation) 
VSWR Chart	

Figure 5-10.5 Omni directional 900Mhz (Long)

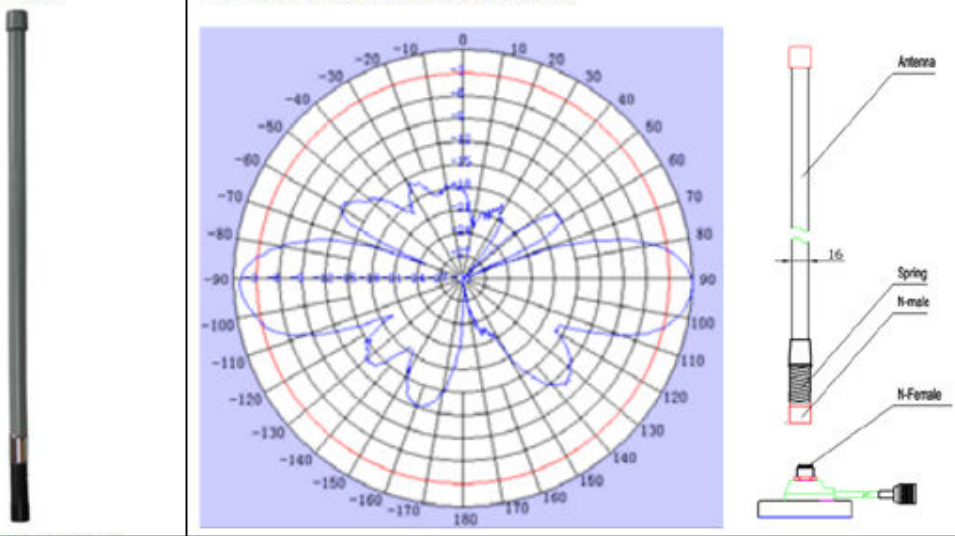
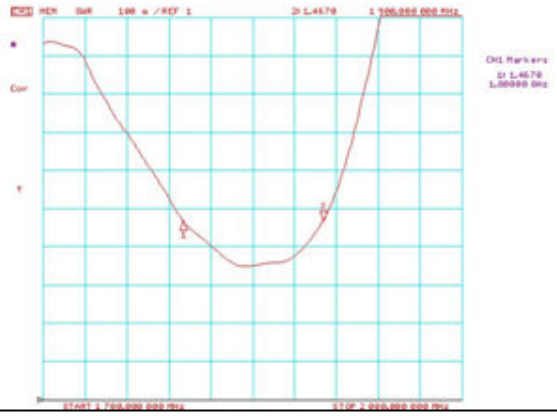
Properties	Specification
Frequency range	1800-1900 MHz
Directivity	Omni-directional
Impedance	50Ω characteristic
Gain	6 dBi
Max power CW	100W
Type	Dipole (ground independent)
Connector	N-type plug on spring
Polarization	Vertical (nominal)
Material	Fiberglass
Height	50 cm
Weight	250 gr.
Mounting	Magnetic base or bulkhead N-type jack
Image	Elevation radiation pattern (elevation) 
VSWR Chart	

Figure 5-10.6 Omni directional 1800Mhz (Long)

Technical Data

Electrical Properties	
Frequency range	1710 - 2170 MHz
Impedance	50 Ω
VSWR	1.8
Polarization	linear, vertical
Gain	8.0 dBi
3 dB beamwidth horizontal	80°
3 dB beamwidth vertical	75°
Downtilt	0°
Front to back ratio	18 dB
Max. power	75 W (CW) at 25°C

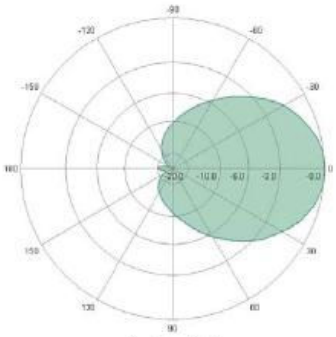
Mechanical Properties	
Dimensions	101 x 80 x 20 mm (3.97" x 3.15" x 0.79")
Weight	0.13 kg (0.29 lbs.)
Radome material	ASA
Radome color	RAL 7035 (light grey)
Operating temperature range	- 40°C to + 80°C
Storage temperature range	- 40°C to + 80°C
Windload	15 N at 160km/h (100mph)

	SMA female

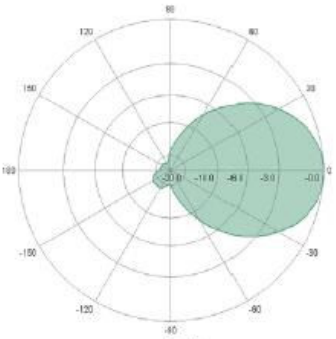
		Optional wall mounting bracket for railway applications.

Wall and mast mounting bracket (1 metal band) included, mast diameter 40-60 mm (1.57" – 2.36")

Radiation Pattern



horizontal



vertical

Figure 5-10.7 Directional 2100Mhz

Transit Antenna

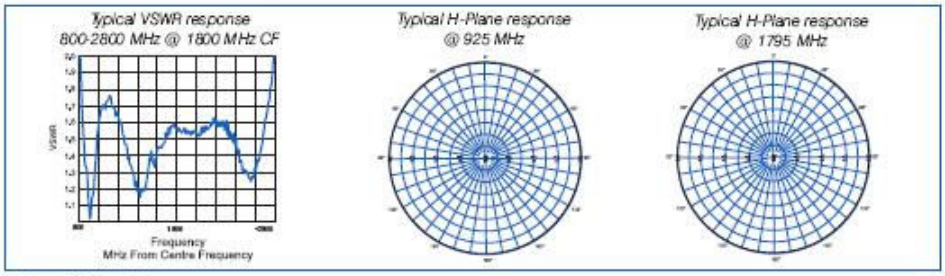
This Antenna is designed specifically for rail, light rail and bus applications and other similarly demanding transit or stationary applications.

With a VSWR less than 2:1 covering 800 - 2700 MHz, It operates in all cellular bands globally plus the 2.4 GHz ISM band.

Designed utilising a high impact, UV stabilised low Flame, Smoke and Toxicity (FST) radome.It is IP68 rated to fully protect against the ingress of dust and water.

Designed to meet the following European Traction Industry Standards:

- NF-F-16-101/102 (materials standard)
- EN50155 (vibration standard)
- EN50124-1 (electrical isolation standard)
- Deutsch Bahn high voltage / current specifications
- Functions with or without a ground plane*



Electrical

Model Number	
Peak Gain *dBi (dBd)*	5 (3) @ 824-960 / 6 (4) @ 1710-2170
Frequency *MHz*	800-960 / 1710-2700
Tuned Bandwidth	Full
VSWR (Return Loss)	<2:1
Nominal Impedance Ω	50
Vertical Beamwidth	38°/180°
Horizontal Beamwidth	Omnidirectional
Input Power *W*	400

Mechanical

Model Number	
Construction	NF-F-16-102 compliant injection moulded radome / cast aluminium alloy base
Area *mm*	205 x 100
Height *mm*	90 including gasket
Termination	Antenna Port: Fixed N-female
Mounting Area	4 x M6 screws (not included)

Fo	1575.42 MHz
Operation Temperature	-40°C to +85°C
Storage Temperature	-40°C to +100°C
System Gain at Fo	28 dBi including cable and filter losses
Impedance	50 Ω
Polarization	RHCP
VSWR at Fo	1.5:1
Noise Figure at Fo	<1.8 dB max.
Power Input	+2.5 VDC to +12 VDC input, Auto Switching
Power Consumption	11 mA to 13 mA (max)
Typical Isolation Between Ports	>36 dB for 806-960 MHz, >30 dB for 1710-2170 MHz, >38 dB for 2400-2700 MHz

* Nominated gain achieved using a 1m² ground plane

Installation

800-960 MHz
1710-2700 MHz

Low Profile Transit Antennas

Description

This Antenna is designed specifically for rail, light rail & bus applications and other similarly demanding transit or stationary applications.

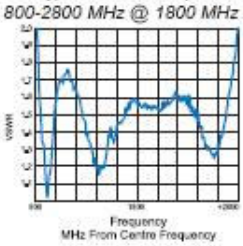
It can be installed with or without a ground plane. Maximum gain is achieved when a ground plane of greater than 1m² is used.

Specifications

Electrical

Model	Frequency	SWR	Gain
	800-960 MHz 1710-2700 MHz	<2:1 over operating band	5dBi (using a 1m² ground plane)

Typical VSWR response
800-2800 MHz @ 1800 MHz CF



Mechanical

Overall dimensions *mm*	100(W) x 200(L) x 90(H) includes gasket
Radome material	UV Stabilised Plastic Moulding
Mount	4 x M6 screws (not included)
Termination	Antenna Port = Fixed N Female

Antenna Assembly Drawing:

Fitting Instructions:

a) Determine area (with clearance) required to mount the antenna, ensuring a flat area is chosen. Ideally the antenna will be installed at the highest position on the roof structure with no obstructions at the same height for at least 1m around the antenna.

b) The Antenna is shaped with minimal wind loading in mind. Mount the antenna with the longest dimension of the antenna running parallel with direction of travel of the train, light rail vehicle or bus.

c) Use the Mounting Detail drawing as a guide (or the actual antenna base plate) to mark out the mounting hole positions for drilling. Ensure no obstructions inside the roof structure at the mounting position. Drill holes to accommodate M6 screws.

d) Use the Mounting Detail drawing as a guide (or the actual antenna base plate) to mark out the connector position(s) for drilling / cutting / punching. Ensure no obstructions inside the roof structure at the mounting position. Drill / cut / punch holes to accommodate the connector(s).
Hole diameters shown on the Mounting detail drawing allow room for diameter of the mating connector(s).

e) Fix the antenna in place using 316 Stainless Steel M6 Hex Drive Cap Screws (not supplied) in the required length. Further details in the Antenna Assembly drawing.

f) Using appropriate test equipment, check the VSWR.

h) To meet high voltage protection specifications for applications involving overhead wires, it is necessary to ensure conductive contact between the base of the antenna and the conductive roof of the carriage / vehicle.

Boresight Gain: 3.00
Front to Back : 0.00 dB
H. Boresight Angle : 9.00°
H. Beamwidth : 360.00°

Pattern Validation : normalized

V. Boresight Angle : 23.00°
V. Beamwidth : 52.45°

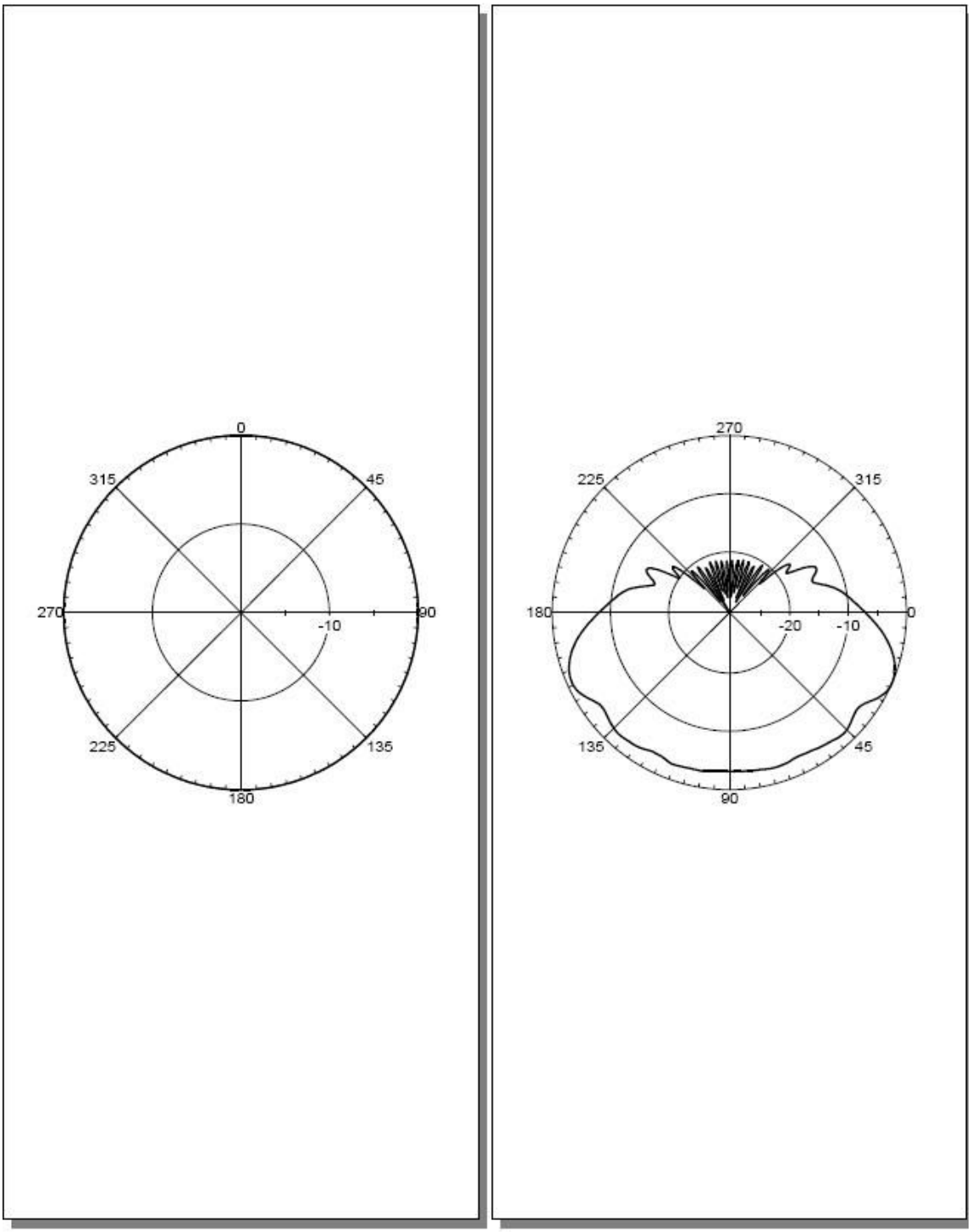


Figure 5-10.8 Shark antenna – Quad Band

5.10.2 Internal Antennas

1.	GSM900 TX frequency band	935-960 MHz
2.	GSM1800 TX frequency band	1805-1880 MHz
3.	UMTS850 TX frequency	824 - 849MHz
4.	UMTS2100 TX frequency	2110 - 2170MHz
5.	UMTS850 TX frequency	824 - 849MHz
6.	Frequency stability	±50 PPB
7.	GSM900 RX frequency band	890-915 MHz
8.	GSM1800 RX frequency band	1710-1785 MHz
9.	UMTS850 RX frequency band	869 - 894MHz
10.	UMTS2100 RX frequency band	1920 - 1980MHz
11.	TX power	23 dBm ±3dB @GSM900 20 dBm ±3dB @GSM1800 30 dBm ±3dB @UMTS850 30 dBm ±3dB @UMTS2100
12.	Receive sensitivity GSM	>-90 dBm
13.	Receive sensitivity UMTS	>-100 dBm
14.	GSM Internal antennae	Dual directional patch
15.	UMTS Internal antennae	single Rx antenna single Tx antenna
16.	Internal antennae gain	5 dBi @ 900 MHz 5 dBi @1800 MHz 7 dBi @850 MHz 7.5 dBi @2100 MHz
17.	Horizontal beam-width	70° @900 MHz 85° @1800 MHz 65° @850 MHz 65° @2100 MHz
18.	Vertical beam-width	102° @ 900 MHz 60° @1800 MHz 65° @850 MHz 65° @2100 MHz

6 Glossary

Cases

7 Known Issues

None.