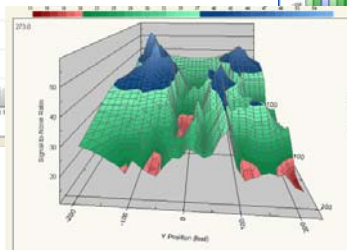
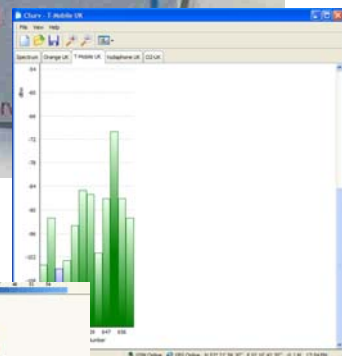
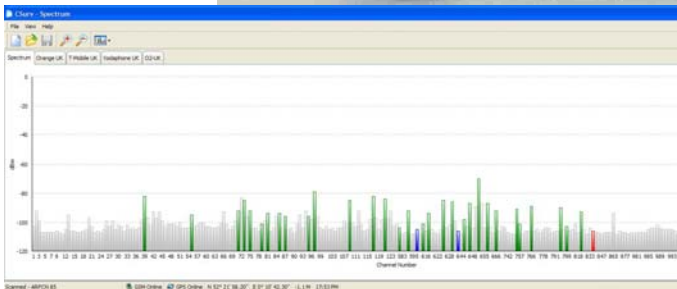




Preliminary Information

08 November 2005



CSurv (& CSurv DRM) - Preliminary

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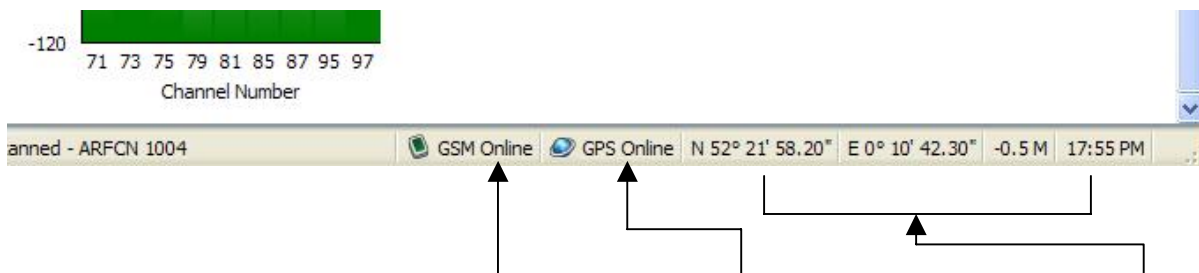
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Bluetooth connection

Data is sent from the CSurv (& CSurv DRM) hardware to the host machine via Bluetooth links. The user system must be equipped with the Bluetooth radio transceiver for the CSurv (& CSurv DRM) system to operate. A suitable Bluetooth Adapter is supplied with CSurv (& CSurv DRM), although user with existing Bluetooth connectivity in their host system may prefer to use the existing transceiver.

In either case the host must connect to the Bluetooth serial devices **CSurv (& CSurv DRM)_GSM_Link** and **CSurv (& CSurv DRM)_GPS_Link**, both devices are set to PIN 1234 for demo purposes, although when shipped this PIN will be unique on each CSurv (& CSurv DRM) system. When correctly connected the Link indicator of the CSurv (& CSurv DRM) front panel will be illuminated.

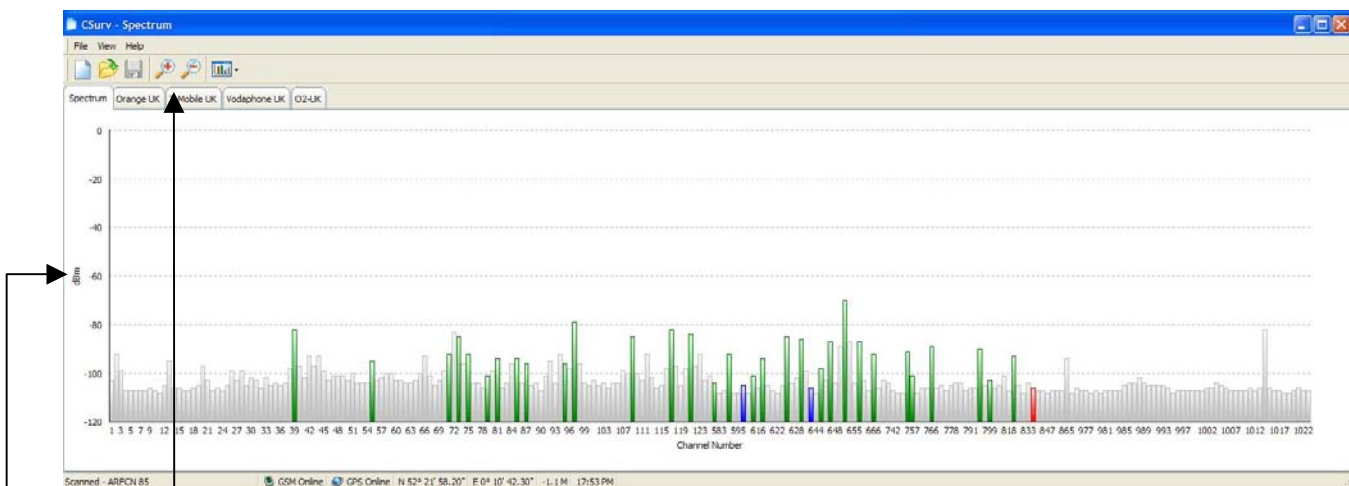
The CSurv (& CSurv DRM) application must be informed as to which serial ports the CSurv (& CSurv DRM) hardware is utilising, The CSurv (& CSurv DRM) application will prompt the user for this information on the initialisation of a new session.



When connected CSurv (& CSurv DRM) will show **GSM Online** and **GPS Online**, followed by the GPS data on the bottom of the CSurv (& CSurv DRM) window.

Data Display

Incoming data is displayed on the PC Screen via the CSurv (& CSurv DRM) application. By default a broad spectrum scan is displayed. This default spectrum display covers GSM900, DCS1800 and PCS1900 bands.



Various display formats can be selected by the user to ease viewing of the incoming data, these are selected from a drop down menu - this feature is purely aesthetic.

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The user may zoom in or out to increase or decrease the resolution of the display. The dBm level — indication on the X-Axis automatically scales as the zoom changes.

During operation, when the user hovers the mouse over any bar on the band scan display, a pop up box will appear whilst the mouse is stationary.

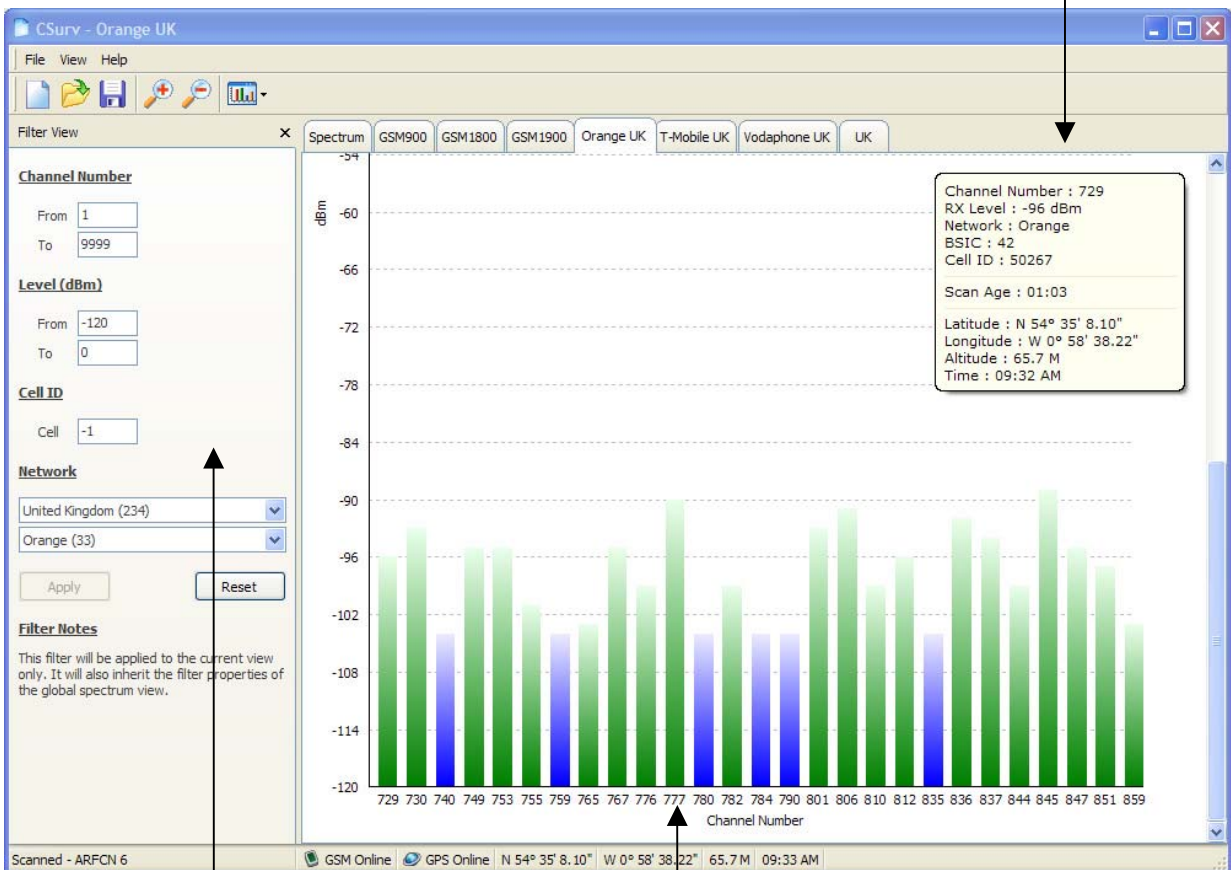
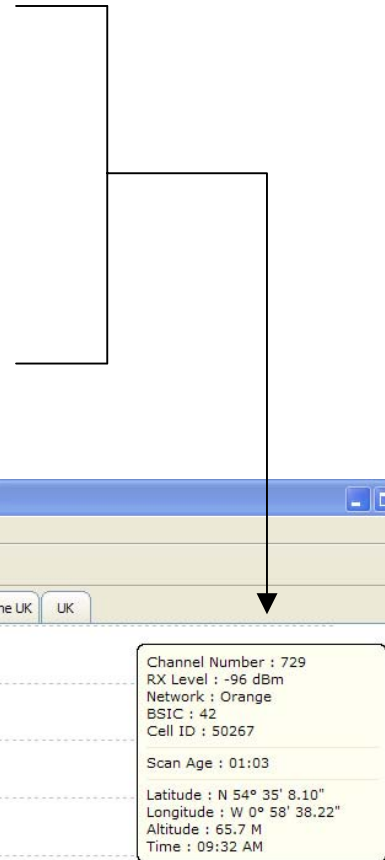
In the box CSurv (& CSurv DRM) will display:

For NON BCCH Channels
Channel Number, Rx Level

For BCCH Channels
Channel Number, BSIC, Rx Lev, MCC, MNC, CELL ID

The elapsed time since the data was last updated.

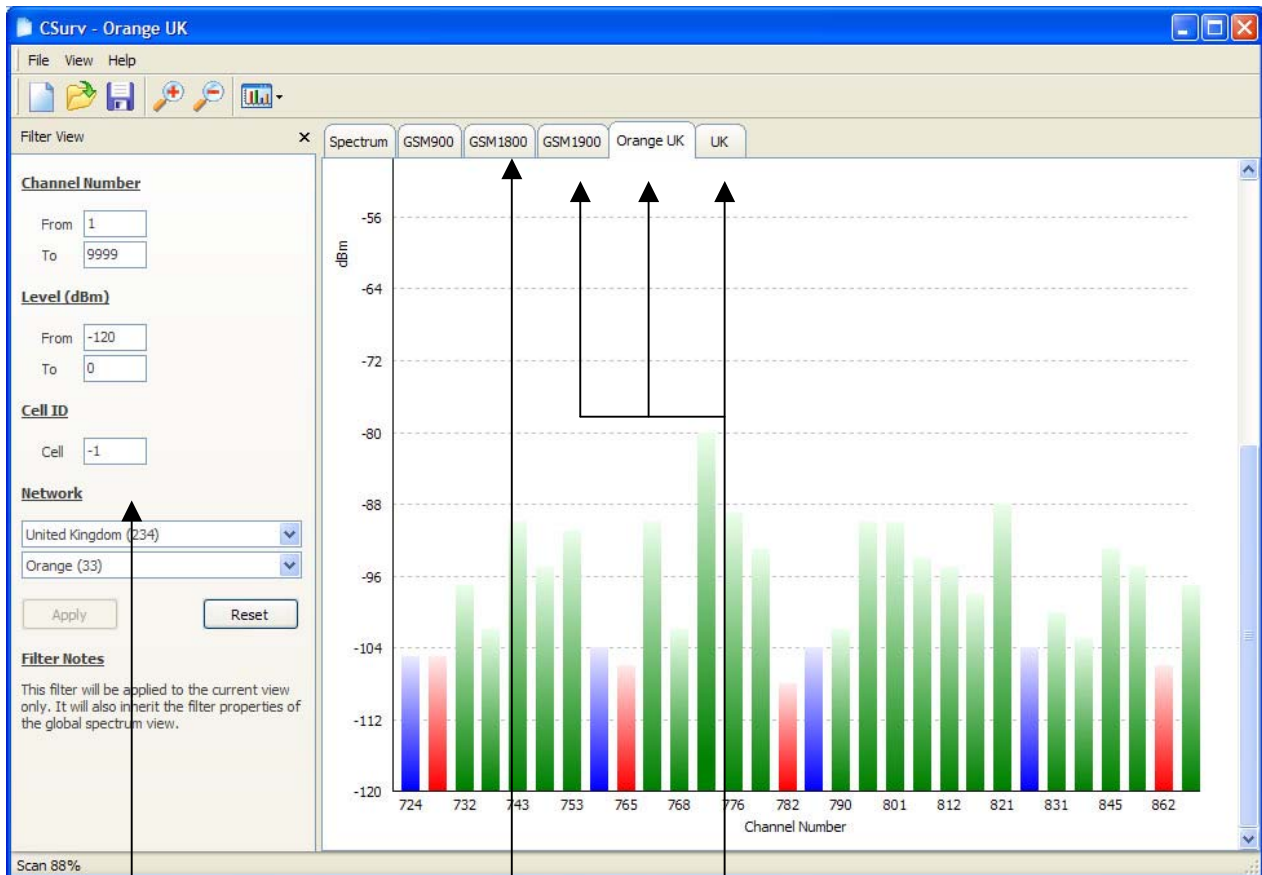
The data derived from the GPS data stream.



User definable filters may be applied to the data being displayed.

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CSurv (& CSurv DRM) Spectrum Filter



Any user defined filter, may be saved for later use and displayed as a Profile

User definable Profiles. CSurv (& CSurv DRM) is supplied with examples of predefined profile, the user may modify or add to these profiles, displaying them as required.

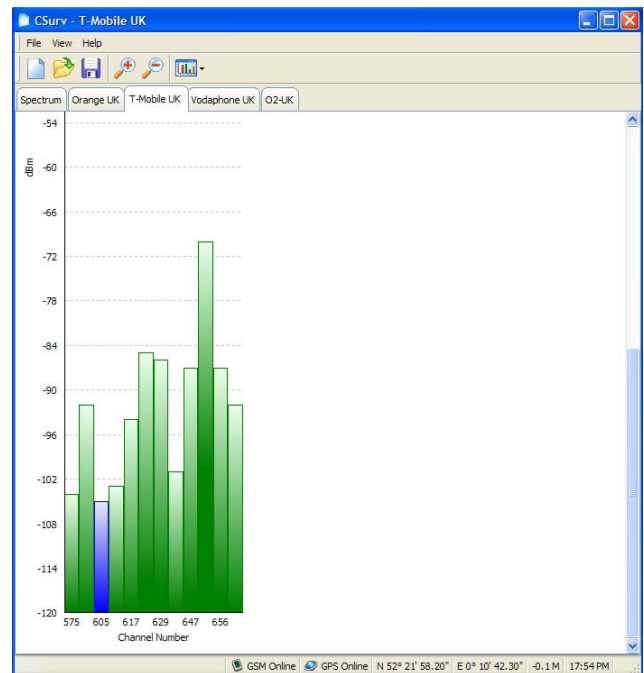
User definable Profile

A major feature in CSurv (& CSurv DRM) is the ability to define filters and apply them to the displayed data. The user may decide what to display based upon: Channel number, Signal level, Cell ID and Network code (or name). Once defined the displayed data is filtered to show the desired information. User defined filters can be saved for re use, in which case they become Profiles. Single clicking on profile tabs allows the user to quickly move between displays of filtered data. Although Profiles allow the user to see filtered data, the stored log file contains ALL data allowing the user to extract information as desired using common tools such as Excel or Access - No data is discarded by CSurv (& CSurv DRM).

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Profile Example

Here we can see a profile that has been created to display only BCCH that are identified as having MCC MNC 234-30 (T-Mobile UK). The Blue bar indicates a BCCH that the network data has designated as barred from use.



Single Channel or Cell display

User definable filters can be configured to show only the data available from a specific cell (BSIC) or an ARFCN. In this way, the coverage of a specific BSIC can be identified in a drive survey.

Note: When CSurv (& CSurv DRM) is configured to display a single Channel or reduced channel scan, the displayed data AND Logged data is reduced to that specified by the profile. In this mode the scan rate is increased to improve resolution and the output can be plotted directly onto a map to show cell coverage.

CELL STATUS

The displayed Spectrum is colour coded to aid quick identification of valid channels

For BCCH the following colours are used:

- 0=Cell_Suitable = Cell is suitable for use (Green)
- 1=Cell_Low_Priority = Cell is low Priority(Green)
- 2=Cell_Forbidden = Cell cannot be used (Blue)
- 3=Cell_Barred = Cell Cannot be used (Blue)
- 4=Cell_Low_Level = Cell Low Level (Red)
- 5=Cell_Other = (Black)

For NON BCCH channels

All non BCCH ARFCN is shown with Level in dBm using colour Grey

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* BCCH_Lock (Drive Survey)

BCCH_Lock allows the user to select a specific BCCH channel, locking Csurv to that channel. Usual BCCH data will be decoded and displayed, in addition relevant data from the the six (6) best surrounding cells will be decoded and displayed in the mouse over window in addition to being stored in the session file.

This feature allows the user to conduct a drive survey logging data related to a specific BCCH channel and the changing best serving surrounding cell data until lock to that BCCH is lost (due to low signal or unacceptably high BER).

At any time during the drive survey, the user may change the focus of Csurv to any one of the best serving surrounding cells and continue the drive survey with Csurv locked to the newly selected BCCH.

**Option, the user may enter an RXLev value below which CSurv will automatically select the best serving surrounding cell BCCH as the new BCCH_Lock channel.*

* Network Select

When activated a network scan is instigated within Csurv. A list of available networks is presented. The user may select any one of the available networks, Csurv will attempt to log onto that network (SIM Less registration) *No call is initiated, thus TA is not available and will be reported as 0.*

CSurv will register with the best serving cell using the standard GSM algorithm for selection. CSurv will present data related to the main cell and the user may select to optionally display the relevant data form upto six |(6) surrounding cells, with an indication of the age of the data displayed.

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Stored Data Format

Incoming data is stored as comma delimited ASCII text. This allows insertion into almost any database or spreadsheet program.

A single record consists of the GPS data (if acquired, use GPGLL data or GPRMC data, if GPGLL data is not available.) along with the GSM information.

The table below shows the arrangement of the data in the comma-delimited string.

Position	Meaning	Details
1	Unique Identifier	This value increments for every record produced and can be used to create a unique identifying label in a database.
2	Day	The Day part of the Date gathered from NMEA 0183. RMC (9)
3	Month	The Month part of the Date gathered from NMEA 0183. RMC (9)
4	Year	The Year part of the Date gathered from NMEA 0183. RMC (9)
5	Hours	The Hours part of the Time gathered from NMEA 0183. RMC (1) or GGA (1) hh
6	Minutes	The Minutes part of the Time gathered from NMEA 0183. RMC (1) or GGA (1) mm
7	Seconds	The Seconds part of the Time gathered from NMEA 0183. RMC (1) or GGA (1) ss
8	Latitude Degrees	Latitude Degrees position gathered from NMEA 0183. GGA (2) ll
9	Latitude Minutes	Latitude Minutes position gathered from NMEA 0183. GGA (2) ll
10	Latitude Seconds	Latitude Seconds position gathered from NMEA 0183. GGA (2) .ll
11	Lat	North or South from NMEA 0183. GGA (3) ,a
12	Longitude Degrees	Longitude Degrees position gathered from NMEA 0183. GGA (4) yy
13	Longitude Minutes	Longitude Minutes position gathered from NMEA 0183. GGA (4) yy
14	Longitude Seconds	Longitude Seconds position gathered from NMEA 0183. GGA (4) .yy
15	Long	East or West NMEA 0183. GGA (5) ,a
16	Fix Type	From NMEA 0183GGA (6) The Fix Type obtained from the GPS satellites. 0, 1 or 2.
17	Satellites in View	The amount of satellites in view of the GPS receiver. GGA (7) 00-12
17a	Antenna Altitude	From NMEA 0183. GGA (10)
18	BCCH Marker	BCCH Carrier detected
19	ARFCN	Absolute radio frequency channel number of BCCH
20	BSIC	BSIC value obtained from the BCCH (in dBm)
21	RXLEV	RXLEV value obtained from BCCH
22	BER	Bit Error rate % from the BCCH
22	MCC	MCC value obtained from the BCCH.
23	MNC	MNC value obtained from the BCCH
20	LAC	Localisation Area Code obtained from the BCCH
21	CELL ID	Cell ID value obtained from the BCCH
22	CELL STATUS	0=Cell_Suitable = Cell is suitable for use (Green) 1=Cell_Low_Priority = Cell is low Priority(Green) 2=Cell_Forbidden = Cell cannot be used (Blue) 3=Cell_Barred = Cell Cannot be used (Blue) 4=Cell_Low_Level = Cell Low Level (Red) 5=Cell_Other = (Black)
23	CELL ALLOCATION	Number of valid Radio Frequency Channels
24		(list, of so comma delimited list, in an additional delimiter - maybe square brackets??)
25	BCCH ALLOCATION	Number of BCCH Radio Frequency Channels
26		(array, of so comma delimited)

GSM Glossary

BCCH [GSM 04.08]

Broadcast Common Control Channel.

BSIC [GSM 03.03]

Base Station Identity Code.

The purpose of the BSIC is to allow the mobile station to identify and distinguish among neighbour cells, even when neighbour cells use the same BCCH frequency.

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CI [GSM 03.03]

Cell Identity.

A 2-byte long hexadecimal identifier that, together with the location area, identifies a cell within a PLMN.

LAC [GSM 03.03, 04.08]

Local Area Code.

MCC [E.212]

Mobile Country Code.

A three-digit identifier that uniquely identifies a country.

MNC [GSM 04.08]

Mobile Network Code.

A two-digit identifier that uniquely identifies a PLMN.

RXLEV [GSM 05.08]

RXLEV provides the results of the measurement of the receiving level on the Air-interface.

The measured signal level shall be mapped to an RXLEV value between 0 and 63, as follows: -

RXLEV 0	=	less than -110 dBm + SCALE.
RXLEV 1	=	-110 dBm + SCALE to -109 dBm + SCALE.
RXLEV 2	=	-109 dBm + SCALE to -108 dBm + SCALE.
RXLEV 62	=	-49 dBm + SCALE to -48 dBm + SCALE.
RXLEV 63	=	greater than -48 dBm + SCALE.

where SCALE is an offset that is used only in the ENHANCED MEASUREMENT REPORT message, otherwise it is set to 0.

The MS shall use the SCALE value as indicated by the parameter SCALE_ORD in the MEASUREMENT INFORMATION message (see 3GPP TS 04.18 and 3GPP TS 04.60). If automatic scaling mode is indicated by SCALE_ORD, the MS shall choose the lowest SCALE value that is sufficient for reporting the strongest signal level within each ENHANCED MEASUREMENT REPORT message.

The MS shall indicate the used SCALE value in each individual ENHANCED MEASUREMENT REPORT message (see 3GPP TS 04.18).

RXQUAL [GSM 05.08]

RXQUAL values are relevant for the decision of the BSC on power control and handover. The value indicates the bit error that was measured on the Air-interface.

Range of Parameter RXQUAL

Eight levels of RXQUAL are defined and shall be mapped to the equivalent BER before channel decoding as follows: -

RXQUAL_0		BER	< 0,2 %	Assumed value =	0,14 %
RXQUAL_1	0,2 % <	BER	< 0,4 %	Assumed value =	0,28 %
RXQUAL_2	0,4 % <	BER	< 0,8 %	Assumed value =	0,57 %
RXQUAL_3	0,8 % <	BER	< 1,6 %	Assumed value =	1,13 %
RXQUAL_4	1,6 % <	BER	< 3,2 %	Assumed value =	2,26 %
RXQUAL_5	3,2 % <	BER	< 6,4 %	Assumed value =	4,53 %
RXQUAL_6	6,4 % <	BER	< 12,8 %	Assumed value =	9,05 %
RXQUAL_7	12,8 % <	BER		Assumed value =	18,10 %

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The assumed values may be employed in any averaging process applied to RXQUAL.

The **BER** values used to define a quality band are the estimated error probabilities before channel decoding, averaged over the full set or sub set of TDMA frames. The accuracy to which an MS shall be capable of estimating the error probabilities when on a TCH under static channel conditions is given in the following table.

Quality Band	Range of actual BER	Probability that the correct RXQUAL band is reported by MS shall exceed			
		Full rate Channel	Half rate Channel	DTX Mode	ECSD FPC mode
RXQUAL_0	Less than 0,1 %	90 %	90 %	65 %	70 %
RXQUAL_1	0,26 % to 0,30 %	75 %	60 %	35 %	60 %
RXQUAL_2	0,51 % to 0,64 %	85 %	70 %	45 %	60 %
RXQUAL_3	1,0 % to 1,3 %	90 %	85 %	45 %	60 %
RXQUAL_4	1,9 % to 2,7 %	90 %	85 %	60 %	60 %
RXQUAL_5	3,8 % to 5,4 %	95 %	95 %	70 %	90 %
RXQUAL_6	7,6 % to 11,0 %	95 %	95 %	80 %	90 %
RXQUAL_7	Greater than 15,0 %	95 %	95 %	85 %	90 %

NOTE 1: For the full rate channel RXQUAL_FULL is based on 104 TDMA frames.
 NOTE 2: For the half rate channel RXQUAL_FULL is based on 52 TDMA frames.
 NOTE 3: For the DTX mode RXQUAL_SUB is based on 12 TDMA frames.
 NOTE 4: For the ECSD FPC mode RXQUAL_FAST is based on 4 TDMA frames.

The accuracy to which an MS shall be capable of estimating the error probabilities when on a TCH under TU50 channel conditions is given in the following table.

Range of actual BER	Expected RXQUAL_FULL	Probability that expected RXQUAL_FULL is reported shall exceed
Less than 0,1 %	RXQUAL_0/1	85 %
0,26 % to 0,30 %	RXQUAL_1/0/2	85 %
0,51 % to 0,64 %	RXQUAL_2/1/3	85 %
1,0 % to 1,3 %	RXQUAL_3/2/4	75 %
1,9 % to 2,7 %	RXQUAL_4/3/5	75 %
3,8 % to 5,4 %	RXQUAL_5/4/6	90 %
7,6 % to 11,0 %	RXQUAL_6/5/7	90 %
Greater than 15,0 %	RXQUAL_7/6	90 %

It should be noted that in the testing, the System Simulator (SS) or (BSSTE) Base Station System Test Equipment will have to measure the average error rate over a large number of TDMA frames.

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Raw data format (Encrypted Bluetooth data stream)

Single channel, or single band, or combinations are possible under CSurv (& CSurv DRM) program control.

GSM900 and DCS1800 or PCS1900 Bands (full band scan).

The format is computer friendly.

For BCCH-Carrier:

<arfcn>,<bsic>,<rxLev>,<ber>,<mcc>,<mnc>,<lac>,<cellId>,<cellStatus>,<numArf
cn>,<arfcn1>...<arfcn64>,<numChannels>,< array1>...<array32>

For non BCCH-Carrier:

<arfcn>,<level>

The numeric format of the parameter CELLSTATUS is the following:

0 - CELL_SUITABLE

1 - CELL_LOW_PRIORITY

2 - CELL_FORBIDDEN

3 - CELL_BARRED

4 - CELL_LOW_LEVEL

5 - CELL_OTHER

CSurv (& CSurv DRM) can be commanded to send data in various formats by the CSurv (& CSurv DRM) program:

0 - Decimal

1- Hexadecimal values, no text

2- Hexadecimal values with text

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A note on Signal Strength Indication

On a mobile phone, it is common to see signal strength represented by bars. These bars indicate the strength of the radio coverage received at the handset. A question often asked is what values are relevant to each indicator bar?

The chart below provides an approximate value indicator.

RxLv Signal Strength	Mobile Phone Bar Indicator	Signal Quality Comments
-75dBm to -40dBm	5	Excellent
-85dBm to -75dBm	4	High Quality
-90dBm to -85dBm	3	Good
-100dBm to -90dBm	2	Average
-110dBm to -100dBm	1	Poor

According to the specification (GSM 03.22 Clause 4.4.2) a mobile network "shall be understood to be received with high quality signal if the signal level is above -85 dBm.

That does not mean a mobile telephone cannot make a call where the signal strength is detected below -85dBm. Mobile networks use a MinLev (poorest signal strength level) that the network will accept for a mobile call to be made. Typically, MinLev RxLv level -106dBm is identified as the lowest a mobile call can be made on some networks. However, approval standards for mobile phones identify detection tests as low as -120dBm. A signal strength level -75dBm can often be found when the mobile is under 1.0Km away from a median height rooftop mast, with fairly open terrain and the landscape clutter is not imposing (e.g. low trees, grass, two-storey properties, main roads etc).

For the above reasons Crownhill CSurv (& CSurv DRM) will allow the user to input a level below which no data is displayed, allowing the user to view only channels that exceed user defined minimum signal strength levels, thus simulating the conditions under which a network will prevent a call being initiated

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Network Operator Codes

CSurv (& CSurv DRM) allows the user to update the numeric and alpha tag descriptors for the Network Operator Codes, Currently the following are preloaded:

20201,"Cosmote"
20205,"Vodafone - Panafon"
20209,"Info Quest S.A."
20210,"Telestet"
20402,"Tele2 (Netherlands) B.V."
20404,"Vodafone Libertel N.V."
20408,"KPN Telecom B.V."
20412,"BT Ignite Nederland B.V."
20416,"BEN Nederland B.V."
20420,"Dutchtone N.V."
20421,"NS Railinfrabeheer B.V."
20601,"Proximus"
20610,"Mobistar"
20620,"Base"
20801,"Orange France"
20802,"Orange France"
20805,"TE.SA.M."
20806,"TE.SA.M."
20807,"TE.SA.M."
20810,"S.F.R."
20811,"S.F.R. (UMTS)"
20820,"Bouygues Telecom"
20821,"Bouygues Telecom"
21303,"Mobiland"
21401,"Vodafone"
21403,"Amena"
21404,"Xfera"
21407,"Movistar"
21601,"Pannon GSM"
21630,"Westel Mobile"
21670,"Vodafone"
21803,"Eronet Mobile Communications Ltd."
21805,"MOBI'S (Mobilina Srpske)"
21890,"GSMBIH"
21901,"Cronet"
21910,"VIPnet"
22001,"Mobitel"
22002,"Promonte GSM"
22003,"Telekom Srbija"
22004,"Monet"
22201,"Telecom Italia Mobile (TIM)"
22202,"Elsacom"
22210,"Omnitel Pronto Italia (OPI)"
22277,"IPSE 2000"
22288,"Wind"
22298,"Blu"
22299,"H3G"
22601,"Mobifon"
22603,"Cosmorom"
22610,"Orange Romania"
22801,"Swiss GSM"
22802,"Sunrise"
22803,"Orange"
23001,"RadioMobil a.s. T-Mobile"
23002,"Eurotel Praha spol. Sro. Eurotel"
23003,"Ceský Mobil a.s. Oskar"
23099,"Ceský Mobil a.s. R&D Centre"
23101,"Orange. GSM"
23102,"Eurotel. GSM & NMT"
23104,"Eurotel. UMTS"
23105,"Orange. UMTS"
23201,"A1"
23203,"T-Mobile"
23205,"One"
23207,"tele.ring"
23208,"Telefonica Austria"
23209,"Tele2 Mobil"
23210,"Hutchison 3G Austria"
23402,"O2 UK Ltd."

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23410,"O2 UK Ltd."
23411,"O2 UK Ltd."
23412,"Railtrack Plc"
23415,"Vodafone Ltd."
23420,"Hutchison 3G UK Ltd."
23430,"T-Mobile UK"
23431,"T-Mobile UK"
23432,"T-Mobile UK"
23433,"Orange"
23434,"Orange"
23450,"Jersey Telecom"
23455,"Guensey Telecom"
23458,"Manx Telecom"
23475,"Inquam Telecom (Holdings) Ltd."
23803,"MIGway A/S"
23805,"ApS KBUS"
23806,"Hi3G"
24001,"Telia AB"
24002,"H3G Access AB"
24003,"Orange Sverige AB"
24004,"3G Infrastructure Services AB"
24005,"Svenska UMTS-Nät AB"
24006,"Vodafone Sverige AB"
24007,"Tele2 Sverige AB"
24008,"Vodafone Sverige AB"
24009,"Nye Telenor Mobile Communications"
24020,"Wireless Maingate AB"
24021,"Banverket"
24201,"Telenor Mobil AS"
24202,"Netcom GSM AS"
24203,"Teletopia Mobile Communications AS"
24204,"Tele2 Norge AS"
24403,"Telia Mobile AB's Branch in Finland"
24404,"Test purposes"
24405,"Radiolinja Origo Oy"
24406,"Test purposes"
24407,"Test purposes"
24408,"Test purposes"
24409,"Finnet Group"
24410,"Test purposes"
24412,"Suomen 2G Oy"
24413,"Test purposes"
24414,"Alands Mobiltelefon Oy"
24415,"Test purposes"
24491,"Sonera Carrier Networks Oy"
24492,"Test purposes"
24601,"Omnitel"
24602,"Bité GSM"
24603,"Tele2"
24701,"Latvian Mobile Phone"
24702,"Tele2"
24801,"EMT GSM"
24802,"RLE"
24803,"Tele2"
25001,"Mobile Telesystems"
25002,"Megafon"
25003,"Nizhegorodskaya Cellular Communications"
25004,"Sibchallenge"
25005,"Mobile Comms System"
25007,"BM Telecom"
25010,"Don Telecom"
25011,"Orensot"
25012,"Baykal Westcom"
25013,"Kuban GSM"
25016,"New Telephone Company"
25017,"Ermak RMS"
25019,"Volgograd Mobile"
25020,"ECC"
25028,"Extel"
25039,"Uralsvyazinform"
25044,"Stuvtelesot"
25092,"Printefone"
25093,"Telecom XXI"
25099,"Bec Line GSM"
25539,"Golden Telecom GSM"
25550,"Ukrainian Mobile Communications"
25567,"Kyivstar"

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302703, "New Tel Mobility"
302710, "Globalstar Canada"
302720, "Rogers Wireless"
302720, "Rogers AT&T Wireless"
30801, "St. Pierre-et-Miquelon Télécom"
31001, "Pacific Mobile"
310010, "MCI"
310012, "Verizon Wireless"
310013, "Mobile Tel Inc."
310014, "Reserved for Testing"
310015, "Southern Communications dba Southern LINC"
310016, "Cricket Communications"
310020, "Union Telephone Company"
310030, "Centennial Communications"
310032, "IT&E Overseas. Inc."
310033, "Guam Telephone Authority"
310034, "Nevada Wireless LLC"
310040, "Concho Cellular Telephone Co. Inc"
310050, "Mossel (Jamaica)"
310060, "Consolidated Telcom"
310070, "Highland Cellular Inc. "
310080, "Corr Wireless Communications LLC"
310090, "Edge Wireless LLC"
310100, "Plateau Telecommunications Inc"
310110, "Reserved for St. Vincent & The Grenadines"
310120, "Reserved for St. Vincent & The Grenadines"
310130, "Amarillo License, L.P (Cellular One of Amarillo) "
310140, "MBO Wireless Inc./Cross Telephone Company"
310150, "Cingular Wireless"
310160, "T-Mobile USA"
310170, "Cingular Wireless"
310180, "West Central Wireless"
310190, "Alaska Wireless"
310200, "T-Mobile USA"
310210, "T-Mobile USA"
310220, "T-Mobile USA"
310230, "T-Mobile USA"
310240, "T-Mobile USA"
310250, "T-Mobile USA"
310260, "T-Mobile USA"
310270, "T-Mobile USA"
310280, "T-Mobile USA"
310290, "T-Mobile USA"
310300, "T-Mobile USA"
310310, "T-Mobile USA"
310320, "T-Mobile USA"
310330, "T-Mobile USA"
310340, "High Plains Midwest LLC. dba Westlink"
310350, "Cable & Wireless"
310360, "Canada/Cleanet"
310380, "Cingular Wireless"
310390, "Yorkville Telephone Cooperative"
310400, "Minnesota Southern Wireless Company dba Hickory Tech"
310410, "Cingular Wireless"
310410, "Cingular Wireless"
310420, "Cincinnati Bell Wireless. LLC"
310430, "Alaska DigiTel, LLC"
310440, "Dobson Cellular Systems"
310450, "North East Cellular Inc"
310460, "TMP Corporation"
310470, "Guam Wireless Tel.Co."
310480, "Choice Phone LLC"
310490, "Triton PCS"
310500, "Public Service Cellular Inc (PSC Wireless)"
310510, "Airtel Wireless LLC"
310520, "VeriSign"
310530, "Key Communications LLC"
310540, "Oklahoma Western Telephone Company"
310550, "Reserved for Testing"
310560, "Dobson Communications Corporation"
310570, "Caribbean Cellular Telephone Ltd."
310580, "PCS ONE"
310590, "Western Wireless"
310600, "Reserved for Barbados"
310610, "Elkhart Telephone Co"
310620, "Coleman County Telecommunications Inc. (Trans Texas PCS)"
310630, "Quantum Communication Group Inc. dba Choice Wireless"

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310640,"Airadigm Communications"
310650,"Reserved for Canada/Stentor"
310652,"Reserved for Canada/Stentor"
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310654,"Reserved for Canada/Stentor"
310655,"Reserved for Canada/Stentor"
310656,"Reserved for Canada/Stentor"
310657,"Reserved for Canada/Stentor"
310658,"Reserved for Canada/Stentor"
310659,"Reserved for Canada/Stentor"
310660,"T-Mobile USA"
310670,"Third Kentucky Cellular"
310680,"Noverr Publishing. Inc. dba NPI Wireless"
310690,"Keystone Wireless LLC"
310700,"Reserved for Canada/Iridium North America"
310701,"Reserved for Canada"
310702,"Reserved for Canada"
310703,"Reserved for Canada"
310710,"Reserved for Canada/Vodafone-Globalstar"
310711,"Reserved for Canada"
310712,"Reserved for Canada"
310713,"Reserved for Canada"
310714,"Reserved for Canada"
310715,"Reserved for Canada"
310716,"Reserved for Canada"
310717,"Reserved for Canada"
310718,"Reserved for Canada"
310719,"Reserved for Canada"
310720,"Rogers Wireless"
310730,"Reserved for Canada"
310740,"Tracy Corporation II (TELEMETRIX)"
310750,"Reserved for Barbabos"
310760,"Panhandle Telecommunications Systems Inc."
310770,"Iowa Wireless Services L.P. "
310780,"Message Express Company dba Airlink PCS"
310790,"Pinpoint Wireless"
310800,"T-Mobile USA"
310810,"Reserved for Barbabos"
310820,"Reserved for Barbabos"
310830,"Caprock Cellular Limited Partnership"
310840,"Cable and Wireless Anguilla"
310850,"Aeris Communications Inc."
310860,"Cable and Wireless West Indies Ltd."
310870,"Kaplan Telephone Company Inc. "
310880,"Advantage Cellular Systems Inc."
310890,"Rural Cellular Corporation"
310900,"Taylor Telecommunications LTD (Texas Cellular)"
310910,"Southern Illinois RSA Partnership (FC)"
310920,"Cable & Wireless Antigua"
310930,"Cable & Wireless Antigua"
310940,"Poka Lambro Telecommunications Ltd. "
310950,"XIT Cellular (Texas RSA 1 Ltd Partnership DBA XIT Cellular)"
310960,"Texas RSA 3 Limited Partnership"
310970,"Globalstar USA"
310980,"Cingular Wireless"
310990,"E.N.M.R. Telephone Cooperative"
311000,"Mid-Tex Cellular"
311010,"Chariton Valley Communications Corporation, Inc."
311020,"Missouri RSA No. 5 Partnership"
311030,"Indigo Wireless Inc. "
311040,"Commnet Wireless. LLC"
311050,"Farmers Cellular Telephone Inc."
311060,"Farmers Cellular Telephone Inc."
311070,"Easterbrooke Cellular Corp."
311080,"Petrocom LLC"
311090,"Siouxland PCS Inc."
311100,"High Plains Wireless"
311110,"High Plains Wireless"
311120,"Choice Phone LLC"
311130,"Amarillo License. L.P."
311140,"MBO Wireless Inc. Cross Telephone Company"
311150,"Wilkes Cellular Inc"
311160,"Endless Mountains Wireless LLC"
311180,"Cingular Wireless LLC. Licensee Pacific Telesis Mobile Services. LLC"
311190,"Cellular Properties Inc (Cellular One of East Central Illinois)"
311210,"Farmers Cellular Telephone Inc."
316010,"Nextel Communications Inc."

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316011, "Southern Communications Services Inc."
33211, "Blue Sky"
334020, "Radiomovil Dipsa SA de CV (TELCEL)"
33403, "Pegaso Communications y Sistemas S.A. De C.V (MOVISTAR GSM)"
33430, "Antigua Public Utility Authority"
338020, "Cable & Wireless Jamaica Ltd."
338050, "Mossel (Jamaica) Ltd."
34001, "Orange Caraïbe Mobiles"
34002, "Outremer Telecom"
34003, "Saint Martin et Saint Barthelemy Telcell Sarl"
34020, "Bouygues Telecom Caraïbe"
36251, "TELCELL GSM"
36269, "CT GSM"
36291, "SETEL GSM"
36301, "Setar GSM"
37010, "Orange. Dominican Republic"
40001, "Azercell GSM"
40002, "Bakcell GSM"
40101, "Kar-Tel llc"
40102, "TSC Kazak Telecom"
40401, "Aircel Digilink India Ltd. Haryana"
40402, "AirTel Punjab"
40403, "AirTel Himachai Pradesh Circle"
40405, "CelForce"
40409, "Reliance Telecom Private Ltd."
40410, "AirTel Delhi"
40411, "Essar Cellphone Delhi"
40412, "Escotel Haryana"
40413, "BSSL Andra Pradesh"
40414, "Spice Punjab"
40415, "Aircel Digilink India Ltd. Haryana"
40418, "Reliance Telecom Private Ltd."
40419, "Escotel Kerala"
40420, "Orange"
40421, "BPL Mobile. Mumbai"
40422, "Idea. Maharashtra Circle"
40424, "Idea. Andra Pradesh Circle"
40427, "BPL Mobile. Maharashtra/Goa"
40430, "Command"
40431, "AirTel"
40436, "Reliance Telecom Private Ltd."
40440, "AirTel. City of Madras"
40441, "RPG Cellular"
40442, "Aircel"
40443, "BPL Mobile. Tamilnadu/Pondicherry"
40444, "Spice. Kamataka"
40445, "AirTel. Kamataka"
40446, "BPL Mobile. Kerala"
40449, "AirTel. Andra Pradesh"
40450, "Reliance Telecom Private Ltd."
40452, "Reliance Telecom Private Ltd."
40456, "Escotel. UP(W)"
40460, "Aircel Digilink India Ltd.. Haryana"
40467, "Reliance Telecom Private Ltd."
40468, "Mahanagar Telephone Nigam Ltd. Delhi"
40469, "Mahanagar Telephone Nigam Ltd. Mumbai"
40470, "Oasis Cellular"
40478, "Idea. Gujarat Circle"
40485, "Reliance Telecom Private Ltd."
40486, "BSSL. Mamataka"
40490, "AirTel. Maharashtra"
40492, "AirTel. Mumbai metro"
40493, "AirTel. Madya Pradesh"
40494, "AirTel. Tamilnadu"
40495, "AirTel. Kerala"
40496, "AirTel. Haryana"
40497, "AirTel. Uttar Pradesh"
40498, "AirTel. Gujarat"
41001, "Mobilink"
41003, "PAK Telecom Mobile Ltd. (UFONE)"
41302, "MTN Network Ltd."
41303, "Celtel Lanka Ltd."
41401, "Myanmar Post and Telecommunication"
41532, "Cellis"
41533, "Cellis"
41534, "Cellis"
41535, "Cellis"

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41536,"Libancell"
41537,"Libancell"
41538,"Libancell"
41539,"Libancell"
41601,"Fastlink"
41677,"Mobilecom"
41701,"Syriatel"
41702,"Spacetel Syria"
41709,"Syrian Telecom"
41902,"Mobile Telecommunications Company"
41903,"Wataniya Telecom"
42001,"Saudi Telecom"
42101,"Yemen Mobile Phone Company"
42102,"Spacetel Yemen"
42202,"GTO"
42402,"Etisalat"
42501,"Partner Communications Co. Ltd."
42502,"Cellcom Israel Ltd."
42601,"BHR Mobile Plus"
42701,"QATARNET"
42899,"Mobicom"
42901,"Nepal Telecommunications"
43211,"Telecommunication Company of Iran (TCI)"
43214,"Telecommunication Kish Co. (KIFZO)"
43219,"Telecommunication Company of Iran (TCI) - Isfahan Celcom"
43401,"Buztel"
43402,"Uzmacom"
43404,"Daewoo Unitel"
43405,"Coscom"
43407,"Uzdunrobita"
43601,"JC Somoncom"
43602,"CJSC Indigo Tajikistan"
43603,"TT mobile"
43604,"Josa Babilon-T"
43605,"CTJTHSC Tajik-tel"
43701,"Bitel GSM"
44001,"NTT DoCoMo. Inc."
44002,"NTT DoCoMo Kansai. Inc."
44003,"NTT DoCoMo Hokuriku. Inc."
44004,"J-Phone Co. Ltd."
44006,"J-Phone Co. Ltd."
44007,"KDDI Corporation"
44008,"KDDI Corporation"
44009,"NTT DoCoMo Kansai Inc."
44010,"NTT DoCoMo Kansai Inc."
44011,"NTT DoCoMo Tokai Inc."
44012,"NTT DoCoMo Inc."
44013,"NTT DoCoMo Inc."
44014,"NTT DoCoMo Tohoku Inc."
44015,"NTT DoCoMo Inc."
44016,"NTT DoCoMo Inc."
44017,"NTT DoCoMo Inc."
44018,"NTT DoCoMo Tokai Inc."
44019,"NTT DoCoMo Hokkaido"
44020,"NTT DoCoMo Hokuriku Inc."
44021,"NTT DoCoMo Inc."
44022,"NTT DoCoMo Kansai Inc."
44023,"NTT DoCoMo Tokai Inc."
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44041,"J-Phone Co. Ltd."
44042,"J-Phone Co. Ltd."

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44043,"J-Phone Co. Ltd."
44044,"J-Phone Co. Ltd."
44045,"J-Phone Co. Ltd."
44046,"J-Phone Co. Ltd."
44047,"J-Phone Co. Ltd."
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44049,"NTT DoCoMo Inc."
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44055,"KDDI Corporation"
44056,"KDDI Corporation"
44058,"NTT DoCoMo Kansai Inc."
44060,"NTT DoCoMo Kansai Inc."
44061,"NTT DoCoMo Chugoku Inc."
44062,"NTT DoCoMo Kyushu Inc."
44063,"NTT DoCoMo Inc."
44064,"NTT DoCoMo Inc."
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44078,"Okinawa Cellular Telephone"
44079,"KDDI Corporation"
44080,"TU-KA Cellular Tokyo Inc."
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44083,"TU-KA Cellular Tokai Inc."
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44085,"TU-KA Cellular Tokai Inc."
44086,"TU-KA Cellular Tokyo Inc."
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44088,"KDDI Corporation"
44089,"KDDI Corporation"
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44092,"J-Phone Co. Ltd."
44093,"J-Phone Co. Ltd."
44094,"J-Phone Co. Ltd."
44095,"J-Phone Co. Ltd."
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44097,"J-Phone Co. Ltd."
44098,"J-Phone Co. Ltd."
44099,"NTT DoCoMo Inc."
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44141,"NTT DoCoMo Inc."
44142,"NTT DoCoMo Inc."
44143,"NTT DoCoMo Kansai Inc."
44144,"NTT DoCoMo Chugoku Inc."
44145,"NTT DoCoMo Shikoku Inc."
44150,"TU-KA Cellular Tokyo Inc."
44151,"TU-KA Phone Kansai Inc."
44161,"J-Phone Co. Ltd."
44162,"J-Phone Co. Ltd."
44163,"J-Phone Co. Ltd."
44164,"J-Phone Co. Ltd."
44165,"J-Phone Co. Ltd."
44170,"KDDI Corporation"
44190,"NTT DoCoMo Inc."
44191,"NTT DoCoMo Inc."
44192,"NTT DoCoMo Inc."
44193,"NTT DoCoMo Hokkaido Inc."
44194,"NTT DoCoMo Tohoku Inc."
44198,"NTT DoCoMo Kyushu Inc."
44199,"NTT DoCoMo Kyushu Inc."
45201,"Mobifone"
45202,"Vinaphone"

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45400,"Hong Kong CSL Ltd."
45403,"Hutchison 3G HK Ltd."
45404,"Hutchison Telephone Company Ltd."
45405,"Hutchison Telephone Company Ltd."
45406,"SmarTone Mobile Communications Ltd."
45407,"China Unicom International Ltd."
45408,"Trident Telecom Ventures Ltd."
45409,"China Motion Telecom (HK) Ltd."
45410,"New World PCS Ltd."
45412,"Peoples Telephone Company Ltd."
45416,"Mandarin Communications Ltd."
45418,"Hong Kong CSL Ltd."
45440,"shared by private TETRA systems"
45447,"Hong Kong Police Force - TETRA systems"
45500,"Smartone"
45501,"Telemovil"
45503,"Hutchison Telecom"
45601,"Mobitel (Cam GSM)"
45602,"Samart (Casacom)"
45603,"S Telecom (CDMA) (reserved)"
45618,"Camshin (Shinawatra)"
45701,"Lao Telecommunications"
45702,"ETL Mobile"
45708,"Millicom"
46000,"China Mobile Communication GSM"
46001,"China Unicom GSM"
46003,"China Unicom CDMA"
46004,"China Satellite Global Star Network"
46140,"Cable & Wireless (Cayman) 3"
47001,"GramenPhone"
47002,"Aktel"
47003,"Mobile 2000"
47201,"DhiMobile"
50200,"Art900"
50212,"Maxis"
50213,"TM Touch"
50216,"DIGI"
50217,"TimeCel"
50219,"CelCom"
51000,"PSN"
51001,"Satelindo"
51008,"Natrindo (Lippo Telecom)"
51010,"Telkomsel"
51011,"Excelcomindo"
51021,"Indosat - M3"
51028,"Konselindo"
51501,"Islacom"
51502,"Globe Telecom"
51503,"Smart Communications"
51505,"Digitel"
52000,"CAT CDMA"
52001,"AIS GSM"
52015,"ACT Mobile"
52501,"SingTel ST GSM900"
52502,"SingTel ST GSM1800"
52503,"MobileOne"
52505,"Starhub"
52512,"Digital Trunked Radio Network"
52811,"DST Com"
53000,"Reserved for AMPS MIN based IMSI's"
53001,"Vodafone New Zealand GSM Mobile Network"
53002,"Teleom New Zealand CDMA Mobile Network"
53003,"Walker Wireless Ltd."
53028,"Econet Wireless New Zealand GSM Mobile Network"
53901,"Tonga Communications Corporation"
53943,"Shoreline Communication"
54101,"SMILE"
54411,"Blue Sky"
54601,"OPT Mobilis"
54720,"Tikiphone"
54901,"Telecom Samoa Cellular Ltd."
60201,"EMS - Mobinil"
60202,"Vodafone Egypt"
60301,"Algérie Telecom"
60302,"Orascom Telecom Algérie"
60400,"Méditerranée (GSM)"
60401,"Ittissalat Al Maghrid"

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60502, "Tunisie Telecom"
60503, "Orascom Telecom"
60701, "Gamcel"
60702, "Africel"
60801, "Sonatel"
60802, "Sentel GSM"
60901, "Mattel"
61001, "Malitel"
61101, "Spacetel"
61102, "Sotelgui"
61201, "Cora de Comstar"
61203, "Orange Côte d'Ivoire"
61205, "Loteny Telecom"
61302, "Celtel"
61303, "Telecel"
61401, "Sahel.Com"
61402, "Celtel"
61403, "Telecel"
61501, "Togo Telecom"
61601, "Libercom"
61602, "Telecel"
61603, "Spacetel Benin"
61701, "Cellplus"
61710, "Emtel"
61901, "Celtel"
61902, "Millicom"
61925, "Mobitel"
62001, "Spacefon"
62002, "Ghana Telecom Mobile"
62003, "Mobitel"
62120, "Econet Wireless Nigeria Ltd."
62130, "MTN Nigeria Communications"
62140, "Nigeria Telecommunications Ltd."
62201, "Celtel"
62202, "Tchad Mobile"
62301, "Centrafrique Telecom Plus (CTP)"
62302, "Telecel Centrafrique (TC)"
62303, "Celca (Socatel)"
62401, "Mobile Telephone Networks Cameroon"
62402, "Orange Cameroun"
62501, "Cabo Verde Telecom"
62601, "Companhia Santomese de Telecomunicações"
62801, "Libertis S.A."
62802, "Telecel Gabon S.A."
62803, "Celtel Gabon S.A."
62901, "Celtel"
62910, "Libertis Telecom"
63086, "Congo-Chine Telecom s.a.r.l."
63102, "Unitel"
63301, "Seychelles Cellular Services"
63310, "Airtel"
63401, "SD Mobitel"
63510, "MTN Rwandacell"
63601, "ETH MTN"
63801, "Evatis"
63902, "Safaricom Ltd."
63903, "Kencell Communications Ltd."
64001, "Tri Telecommunication (T) Ltd."
64002, "MIC (T) Ltd."
64003, "Zantel"
64004, "Vodacom (T) Ltd."
64005, "Celtel (T) Ltd."
64101, "Celtel Uganda"
64110, "MTN Uganda Ltd."
64111, "Uganda Telecom Ltd."
64201, "Spacetel Burundi"
64202, "Safaris"
64203, "Telecel Burundi Company"
64301, "T.D.M. GSM"
64501, "Celtel Zambia Ltd."
64502, "Telecel Zambia Ltd."
64601, "MADACOM"
64602, "Société Malgache de Mobiles (SMM)"
64700, "Orange La Réunion"
64702, "Outremer Telecom"
64710, "Société Réunionnaise du Radiotéléphone"
64801, "Net One"

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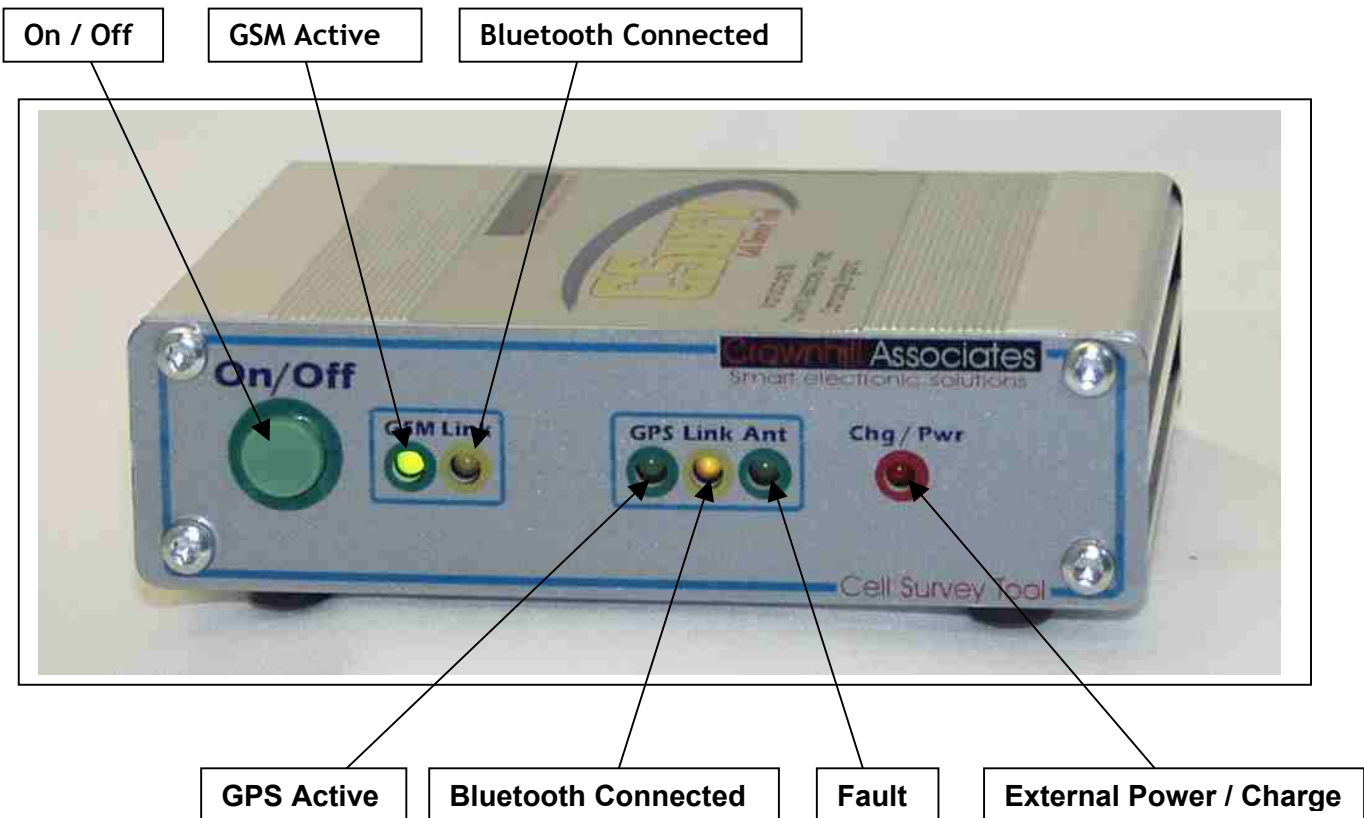
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CSurv (& CSurv DRM) - Preliminary

64803,"Telecel"
64804,"Econet"
64901,"Mobile Telecommunications Ltd."
65001,"Telekom Network Ltd."
65010,"Celtel Ltd."
65101,"Vodacom Lesotho (pty) Ltd."
65102,"Econet Ezin-cel"
65201,"Mascom Wireless"
65202,"Vista Cellular"
65310,"Swazi MTN"
65501,"Vodacom (Pty) Ltd."
65506,"Sentech (Pty) Ltd."
65507,"Cell C (Pty) Ltd."
65510,"Mobile Telephone Networks"
65521,"Cape Town Metropolitan Council"
70267,"Belize Telecommunications Ltd. GSM"
70268,"International Telecommunications Ltd. GSM"
70601,"CTE Telecom"
70610,"CTE Telecom"
70602,"Digicel"
71201,"Instituto Costarricense de Electricidad - ICE"
71610,"TIM Peru"
72207,"Telefonica"
72234,"Telecom Personel S.A."
72235,"Hutchison"
72400,"Telet"
72401,"CRT Cellular"
72402,"Global Telecom"
72403,"CTMR Cel"
72404,"BCP"
72405,"Telesc Cel"
72406,"Tess"
72407,"Sercontel Cel"
72408,"Maxitel MG"
72409,"Telepar Cel"
72410,"ATL Algar"
72411,"Telems Cel"
72412,"Americel"
72413,"Telesp Cel"
72414,"Maxitel BA"
72415,"CTBC Cel"
72416,"BSE"
72417,"Ceterp Cel"
72418,"Norte Brasil Tel"
72419,"Telemig Cel"
72421,"Telerj Cel"
72423,"Telest Cel"
72425,"Telebrasil Cel"
72427,"Telegoias Cel"
72429,"Telemat Cel"
72431,"Teleacre Cel"
72433,"Teleron Cel"
72435,"Telebahia Cel"
72437,"Telergipe Cel"
72439,"Telasa Cel"
72441,"Telpe Cel"
72443,"Telepisa Cel"
72445,"Telpa Cel"
72447,"Telern Cel"
72448,"Teleceara Cel"
72451,"Telma Cel"
72453,"Telepara Cel"
72455,"Teamazon Cel"
72457,"Teleamapa Cel"
72459,"Telaima Cel"
73001,"Entel"
73010,"Entel"
73401,"Infonet"
73402,"Corporación Digitel"
73403,"Digicel"
73601,"Neuvatel PCS De Bolivia SA"
73602,"Entel SA"
74401,"Hola Paraguay - VOX"
74402,"Copesa"
74602,"TeleG"
90103,"Iridium Satellite. LLC (GMSS)"

CSurv (& CSurv DRM) - Preliminary

CSurv (& CSurv DRM) Hardware



Construction:

- Extruded Aluminium Box section with CNC milled end panels.
- Small overall dimensions; 108.5mm x 82mm x 29.5mm
- Gold flashed RF connections
- AC or DC input (low voltage)



Power:

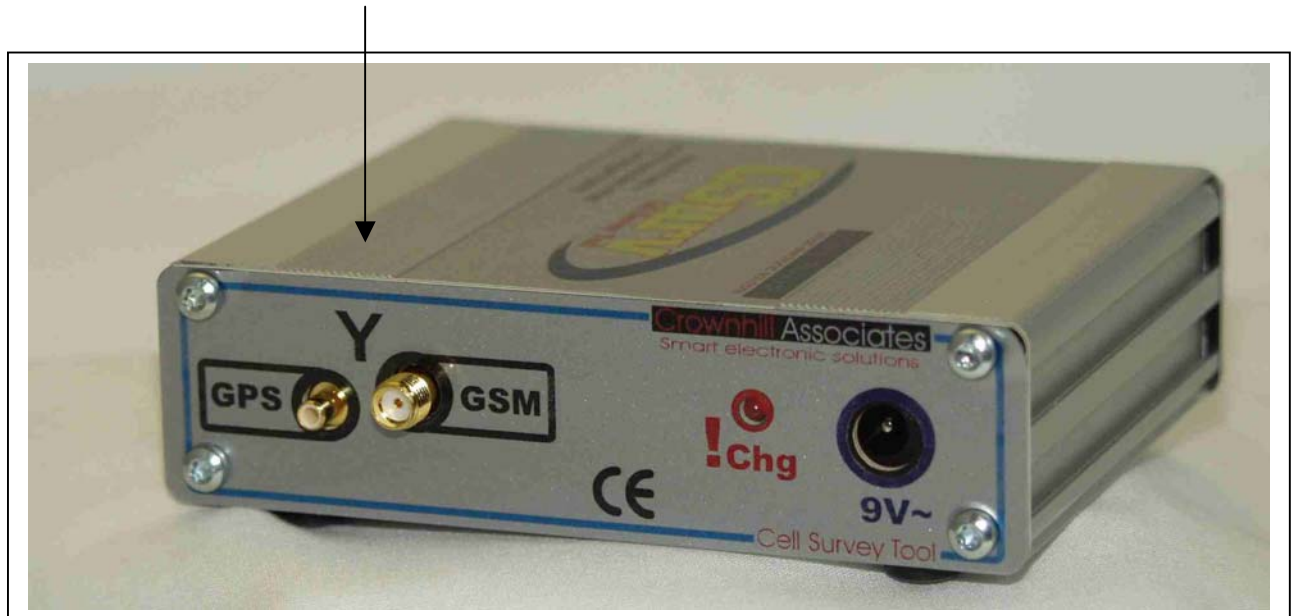
- Single Internal Lithium Battery and Charging regulator, High cell voltage of 3.6 Volts and up to 1000Ah capacity available.
- Can be deep cycled. The cell maintains a constant voltage for over 80% of its discharge curve.
- No memory effect. No reconditioning needed. Tolerates microcycles
- Very low self discharge rate. Can retain charge for up to ten years.

CSurv (& CSurv DRM) - Preliminary

CSurv (& CSurv DRM) Hardware Operation

The CSurv (& CSurv DRM) hardware has been designed to be simple to operate, user interaction has been reduced to the minimum possible.

Connection of Antenna is critical to the operation of the CSurv (& CSurv DRM) hardware, incorrect connection should not result in damage, but will result in poor or invalid data recovery. The antenna sockets are located on the rear panel of the CSurv (& CSurv DRM) hardware, the sockets are not interchangeable.



Since the GPS antenna is active, the CSurv (& CSurv DRM) hardware supplies a low current low voltage supply via the antenna cable. On the front panel of the CSurv (& CSurv DRM) hardware the GPS antenna Fault indicator will illuminate when the antenna is short circuit. The CSurv (& CSurv DRM) hardware should not be operated when the GPS antenna fault light is illuminated.

Power needs to be connected only when the battery requires charging, an indicator on the front panel will light when power is connected. When power is available, the internal battery is disconnected from the CSurv (& CSurv DRM) processor and the battery is charge, CSurv (& CSurv DRM) then runs from the external power source. CSurv (& CSurv DRM) makes provision for protection against overcharge of the battery or over discharge.

An indicator on the rear panel illuminates if there is a charging error. The CSurv (& CSurv DRM) hardware should not be operated when the charge fault light is illuminated.

The CSurv (& CSurv DRM) hardware is activated by a single press of the momentary make on/off button and is deactivated by pressing and holding the same button for approx 3 seconds before releasing the button.

Upon activation the GSM lamp will illuminate momentarily and after internal housekeeping has been completed the lamp will flash at approx 1 second intervals, indicating correct operation.

Likewise the GPS lamp will flash at approx 1 second intervals once valid data is available

The Bluetooth Lock lamps will remain in a steady on state when the Bluetooth host has connected. Else they flash indicating their availability for connection.

CSurv (& CSurv DRM) - Preliminary

Lithium cell technology

CSurv (& CSurv DRM) utilises a lithium battery, this affords many advantages over conventional battery technology.

Advantages

- High cell voltage of 3.6 Volts means fewer cells and associated connections and electronics are needed for high voltage batteries. (One Lithium cell can replace three NiCad or NiMH cells which have a cell voltage of only 1.2 Volts)
- No liquid electrolyte means they are immune from leaking.
- Very high energy density
- Low weight
- Up to 1000Ah capacity available.
- Fast charge possible.
- Can be deep cycled. The cell maintains a constant voltage for over 80% of its discharge curve. It thus delivers full power down to 80% .This means that in practice, for a given capacity, more of the stored energy is usable before becoming effectively discharged.
- Very low self discharge rate. Can retain charge for up to ten years.
- Very high coulombic efficiency (Capacity discharged over Capacity charged) of almost 100%. Thus very little power is lost during the charge/discharge cycles.
- No memory effect. No reconditioning needed.
- Tolerates micro cycles
- Long cycle life. Cycle life can be extended significantly by using protective circuits to limit the permissible DOD of the battery. This mitigates against the high initial costs of the battery.
- Does not need reconditioning as do nickel based batteries.

Shortcomings

Stability of the chemicals has been a concern in the past. Because Lithium is more chemically reactive special safety precautions are needed to prevent physical or electrical abuse and to maintain the cell within its design operating limits.

Measurement of the state of charge of the cell is more complex than for most common cell chemistries. The state of charge is normally extrapolated from a simple measurement of the cell voltage, but the flat discharge characteristic of lithium cells, so desirable for applications, renders it unsuitable as a measure of the state of charge. For these reasons CSurv (& CSurv DRM) provides no state of charge indicator

These drawbacks are far out weighed by the advantages of Lithium cells CSurv (& CSurv DRM) takes full advantage of the Lithium cell technology.

Charging Notes

Should be charged regularly.

Battery lasts longer with partial charges rather than full charges.

Can not tolerate overcharging and hence should not be trickle charged, CSurv (& CSurv DRM) prevents overcharge damage

Charging method employed by CSurv (& CSurv DRM): Constant Current - Constant Voltage .

CSurv (& CSurv DRM) - Preliminary

CSurv (& CSurv DRM) Variants

Data Logger:

CSurv (& CSurv DRM) with provision for compact Flash memory card. All data will be logged to the compact flash card. No Bluetooth connectivity will be available.

The Compact Flash card will be readable in a PC environment to allow recovery of the data.

The Data logger will allow complex user profiles via a configuration file is created on the PC and stored in the Compact flash before deployment of the CSurv (& CSurv DRM) Data Logger.

Configuration will allow the user to determine when Data logging begins and ends by:

1. GPS TIME
2. GPS Location (within a specific location window)

Subject to 1&2 above:

Network code

and or

BSIC code

and or

above a specific Signal Level

CSurv (& CSurv DRM) DRM

CSurv (& CSurv DRM) and CSurv (& CSurv DRM) Data Logger with Dead Reckoning GPS system. Initial location lock provided by conventional GPS is supported by a Firmware Kalman filter to provide a location fix where GPS signals are unavailable, The Kalman Filter blends Dead Reckoning with GPS data to provide an optimal fix – NO additional infrastructure or network is required – The system is passive. As used in the US Army Land Warrior Program to replace compass and pace counting. This system works INSIDE buildings, unaffected by Urban Canyons, nearby buildings, heavy foliage or other situations that normally affect GPS reliability. The proprietary algorithms in the CSurv (& CSurv DRM) DRM system use GPS to calibrate dead reckoning sensors to provide a dead reckoning accuracy of between 2% and 5% of distance travelled, without the use of GPS.

Note:

CSurv is under constant development, for example DRM may be superseded by newer technology, we are currently evaluating a new GPS system architecture. This new architecture provides superior location performance, both indoors and out. The new architecture is currently achieving a time-to-first-fix of one second for aided starts in outdoor GSM environments and acquiring signals down to -159 dBm. This makes real-time navigation practical in many indoor environments, through urban canyons, and under dense foliage. Performance at present is better than DRM aided conventional GPS. Unlike the lengthy sequential search process of traditional GPS architectures, the new architecture, with the equivalent of more than 200,000 correlators, enables fast and deep GPS signal search capabilities, resulting in significant improvement over today's architectures that contain a few hundred to a few thousand correlators.

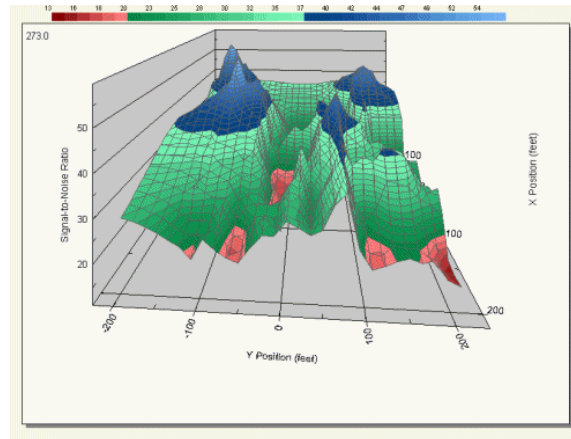
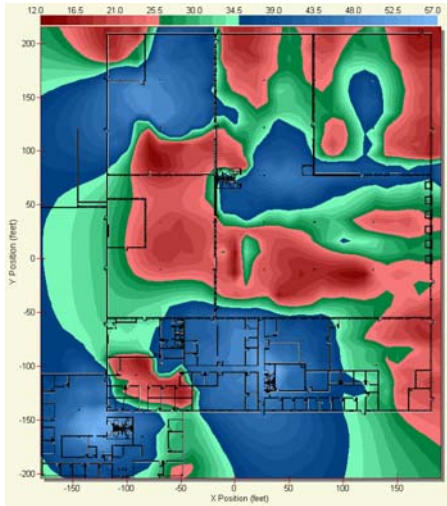
Understandably this new technology carries a cost overhead compared to traditional GPS, however it is considerably more cost effective than the current DRM solution

CSurv (& CSurv DRM) - Preliminary

Future Development

CSurv (& CSurv DRM) Mapping

Based on client feedback we are developing a mapping system to provide a comprehensive graphical presentation of the recovered data, showing cell site coverage, signal level and client specific data., based upon room plans. Currently we are developing mapping solutions based upon Microsoft Mapoint, we are evaluating the use of Mapinfo Professional as a mapping solution. Mapping and mapping requirements are usually very specific to client needs, thus we expect to provide bespoke mapping solutions rather than a single Mapping application. We would like to open dialogue with interested end users and third party developers.



CSurv (& CSurv DRM) 3G

A 3G version of CSurv (& CSurv DRM) is currently under development, prototype hardware is functional, Anticipated release date Qtr2 2006.