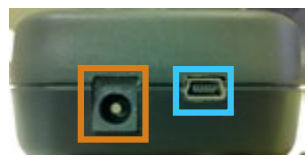
SQUID-4G

User manual version 1.4

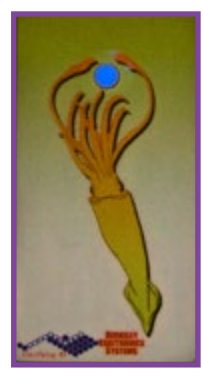
Contents

Unpacking - Upon opening the box that Squid-4G comes shipped in, you will see the Pelican case and below that a documentation box containing an SD card, calibration certificate and AC auto adapter. Inside the Pelican carrying case you will find the Squid-4G unit, AC charger and antennas.

Before You Start - Completely charge up your Squid-4G using the supplied AC/DC transformer. Note the mini-USB port for later use with a PC. Be sure to also securely connect all antennas to the Squid-4G for maximum sensitivity.



Starting Up - Power up Squid-4G by pressing the pushbutton trackball or center keypad black button (model dependent) on the front of the unit. You should notice a horizontal startup bar for approximately 20 seconds. After startup, Squid-4G scans all nearby cellular networks followed by the acquisition of base station names and finally GPS satellite lock. Time scan usually takes between 1 to 2 minutes total for all networks.



Navigation- Some Squid units utilize a small pushbutton trackball for navigation while other units utilize a standard five pushbutton keypad layout (left, right, up, down and select (black center button)). These two different models are only cosmetically different. Functionally, they are identical.

Connecting Antenna - Be sure to connect all antennas before making scanning for any carriers. The antenna inputs are hardwired to their respective bands. Looking at thr rear of the unit:

Top left SMA connection is for CDMA carriers like Verizon

Right SMA connection is for UMTS/GSM carriers like AT&T and T-Mobile

Bottom left connection is only for GPS connection (active GPS antenna only).

Magnetic Hook - Squid-4G contains a fold-out hook that easily slips onto a utlity belt or low hanging wire. The embedded magnet also allows Squid-4G to be mounted temporarily to metal surfaces.

Main Screen - Once the Squid-4G powers up and scans all nearby base stations, you will notice the main screen complete with Network Carrier, Type of wireless standard, RSSI measurements in dBm and Squid-4G menu icons below.

4G LTE base stations are listed according to their wireless carriers. Not all carriers are supported. Some carriers sharing bandwidth with other carriers will not be displayed. Consult the FCC's commercial 4G allocation for your area for details.

FRQ MHz lists the neareast wireless carrier frequencies detected. Not all bands are supported so ask your BVS sales agent.

RSRP values are listed as they are scanned. Use the RE-LIST SORT BY RSRP function to place the strongest base stations at the top.

DOWN ARROW UP ARROW SORT BY RSRP DISPLAY REFRESH ANTENNA INFO GPS INFO BATTERY POWER OFF

ICONS and their FUNCTIONS

DOWN ARROW - Use this arrow to scroll down when the list is greater than 4.

UP ARROW - Use this arrow to scroll up when the list is greater than 4.

REFRESH DISPLAY- Use this to update info on the screen and remove or add items that are not current.

SORT BY RSRP - This icon lists RRP so that the strongest RSRP values appear at the top (for instance, -55 dBm is stronger than -93 dBm)

INFORMATION - This screen displays which antenna (left and right) is receiving which wireless carrier standard.

GPS - Displays navigation information including latitude, longitude, UTC and fix. The GPS antenna must be connected to the GPS connector on the top of the unit in order to achieve GPS lock. If your unit does not contain a Sprint module, you must use an active antenna to achieve GPS lock.

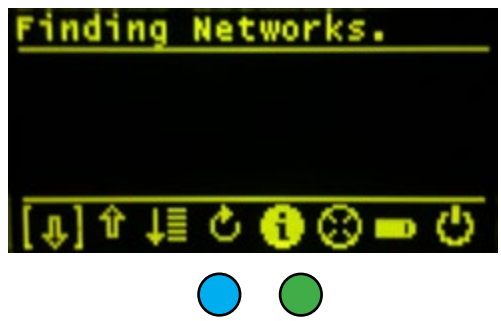
BATTERY - This screen displays battery power left (percentage) of the Squid's internal batteries. Typical runtime is approximately 8 hours.

POWER OFF - Select this icon to turn off the Squid.

BACK ARROW - Select this icon anytime to go back to the previous screen

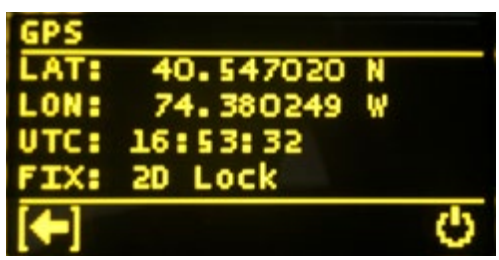
USER SCREENS and their FUNCTIONS

STARTUP SCREEN - Upon power up, Squid-4G will display the firmware version and progress bar. It typically takes about 30 seconds for Squid-4G to power up and begin locating nearby base stations. If your unit shows older firmware, contact BVS support for upgrade procedures.

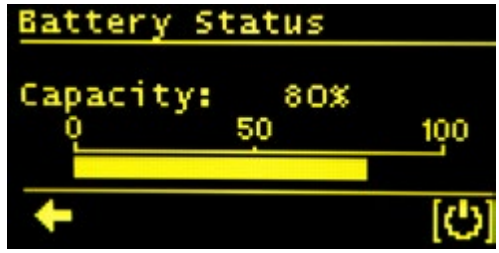


FINDING NETWORKS - After the startup screen, Squid-4G takes a moment to find and list nearby networks by brand name, band and RSRP value. Even if this list has filled the screen, Squid-4G may continue to add base stations and acquire more names. CDMA networks are typically found almost instantly. GSM/UMTS networks generally take longer to acquire and are scanned while "Finding Networks..." is shown. (models with trackballs will blink GREEN and BLUE until it has found all networks listed)

ANTENNA INFORMATION - This screen displays which antenna (left, center & right) is receiving which wireless standard. These connections are hard-wired to the receiver modules so the user knows that when facing the screen, left antenna connection is always for GSM while the connection on the right is always CDMA. The function of the center antenna depends on the Squid-4G configuration. If equipped with a Sprint CDMA module, the center antenna is a shared CDMA/GPS (passive) antenna. If not equipped with a Sprint module, the center antenna is an active GPS antenna and marked appropriately.



GPS - Displays navigation information including latitude, longitude, UTC and fix. The GPS antenna must be connected to the GPS connector on the top of the unit in order to achieve GPS lock. If your unit does not contain a Sprint module, you must use an active antenna to achieve GPS lock.



BATTERY STATUS - This screen displays battery power left (percentage) of the Squid's internal batteries. Typical runtime is approximately 8 hours.

RSRP DIRECTION FINDING - This screen is most useful for antenna alignment when the operator may be out of arm's reach to the unit while holding or repositioning an antenna. Notice the PEAK HOLD at the end of the horizontal dBm. That will remain until a higher dBm is detected.

POWER OFF - Select this power icon to turn off the Squid.

EMERGENCY SHUTOFF SWITCH - Since Squid-4G powers off normally through software, there is a small possibility that the software can become unresponsive. In this case, Squid-4G would not be able to be shut down until the battery fully dies. For this reason, an emergency shut off switch is located on the right side of the unit on it's side. Use a paper clip or any wire small enough to fit intothe hole. Hold the switch until the screen goes dark. You may now power your Squid-4G back up again normally.

BASE STATION INFORMATION - This screen allows the user to see many details about the currently selected base station.

OPTIONAL DIRECTION FINDING ANTENNA - This option includes a DF antenna, bracket and antenna cable. Note the assembly in the photo. Attach antenna before powering up the Squid-4G. Recommended procedure for DF antenna use is to begin by first attaching omni-directional antenna(s) to acquire local base stations. After all local carriers have been detected, swap out omni for direction finding antenna. Be sure to choose the appropriate antenna connection (left connector for AT&T or T-Mobile or right connector for Verizon).

TYPICAL Squid-4G APPLICATIONS - Since Squid-4G provides dBm accurate measurements, it allows installers to verify and optimize M2M sites for the following applications and more.

Remote Meter Reading

Power Station Monitoring & Control

Variable Message Signs

Gas, Water & Oil Flow Monitoring

Fire, Law & Rescue Operations

Cellular ATM Transactions

Cellular Lottery Terminal Transactions

Fleet Management Solutions

GLOSSARY OF M2M TERMS

AVL (automatic vehicle location)
A system that determines the geographic location of a vehicle and transmits this information to a tracking center.

CDMA (code division multiple access)
A form of multiplexing that allows numerous signals to occupy a single transmission channel, optimizing the use of available bandwidth. The technology is used in UHF (ultra high frequency) cellular systems in the 800 MHz and 1.9 GHz bands. CDMA offers several data bearer options including IS-95, 1xRTT, and SMS (short-message service).

Condition Monitoring
The process of monitoring a parameter of condition in equipment, such that a significant change is indicative of a developing failure. It is a major component of predictive maintenance. The use of conditional monitoring allows maintenance to be scheduled, or other actions to be taken to avoid the consequences of failure, before the failure occurs. Nevertheless, a deviation from a reference value (e.g. temperature or vibration behavior) must occur to identify impeding damages.

EDGE (enhanced data rates for GSM environment)
A digital mobile phone technology that allows increased data transmission rates and improved data transmission reliability.

Edge Device
These wireless device networking solutions connect virtually any intelligent device to the Internet or IP network for remote monitoring, control and configuration.

GPRS (general packet radio service)
A packet-based wireless communication service that delivers data at rates up to 114 Kbps and continuous connection to the Internet for mobile phones, devices, and computers on GSM networks.

GSM (global system for mobile communication)
A digital wireless system that uses a variation of TDMA (time division multiple access) to digitize and compress data. It then sends this data down a channel with two other streams of user data, each in its own time slot. GSM operates at either the 900 MHz or 1800 MHz frequency band and offers several data bearer options including GPRS (general packet radio service), HSCSD (high-speed circuit switched data), and SMS (shortmessage service).

LBS (location based services)
A location-based service (LBS) is an information service, accessible with mobile devices through the mobile network and utilizing the ability to make use of the geographical position of the mobile device. LBS services can be used in a variety of contexts, such as health, work, personal life, etc. LBS services include services to identify a location of a person or object, such as discovering the nearest banking cash machine or the whereabouts of a friend or employee. LBS services include parcel tracking and vehicle tracking services. LBS can include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location. They include personalized weather services and even location-based games.

MNO

A mobile network operator (MNO), also known as mobile phone operator, carrier service provider (CSP), wireless service provider, wireless carrier, or cellular company, is a telephone company that provides services for mobile phone subscribers.

MVNO

A mobile virtual network operator (MVNO) is a company that provides mobile phone service but does not have its own licensed frequency allocation of radio spectrum, nor does it necessarily have all of the infrastructure required to provide mobile telephone service. A company that does have frequency allocation(s) and all the required infrastructure to run an independent mobile network is known simply as a Mobile Network Operator (MNO). MVNOs are roughly equivalent to the "switchless resellers" of the traditional landline telephone market. Switchless resellers buy minutes wholesale from the large long distance companies and retail them to their customers.

Smart Grid

A smart grid includes an intelligent monitoring system that keeps track of all electricity flowing in the system. It also incorporates the use of superconductive transmission lines for less power loss, as well as the capability of integrating alternative sources of electricity such as solar and wind. When power is least expensive a smart grid could turn on selected home appliances such as washing machines or factory processes that can run at arbitrary hours. At peak times it could turn off selected appliances to reduce demand.

Smart Services

The use of advanced sensing, communication, and control technologies to deliver services more effectively, economically, and securely.

SMS (short-message service)

The process of sending short data messages to and from mobile phones and devices.

Telematics

The integration of wireless communication devices (and often location tracking devices) into automobiles for remote engine diagnostics, stolen vehicle surveillance,roadside assistance, etc.

Telemedicine

Telemedicine is a rapidly developing application of clinical medicine where medical information is transferred through interactive media for the purpose of consulting, and sometimes remote medical procedures or examinations. Telemedicine may be as simple as two health professionals discussing a case over the telephone, or as complex as using satellite technology and videoconferencing equipment to conduct a real-time consultation between medical specialists in two different countries. Telemedicine generally refers to the use of communications and information technologies for the delivery of clinical care.

Telemetry

A highly automated communications process by which measurements are made and data collected at remote or inaccessible points and transmitted to receiving equipment for monitoring, display, and recording. Telemetry may also include two-way communication for the purpose of remote machine management and control.

Squid Network Report Utility Manual

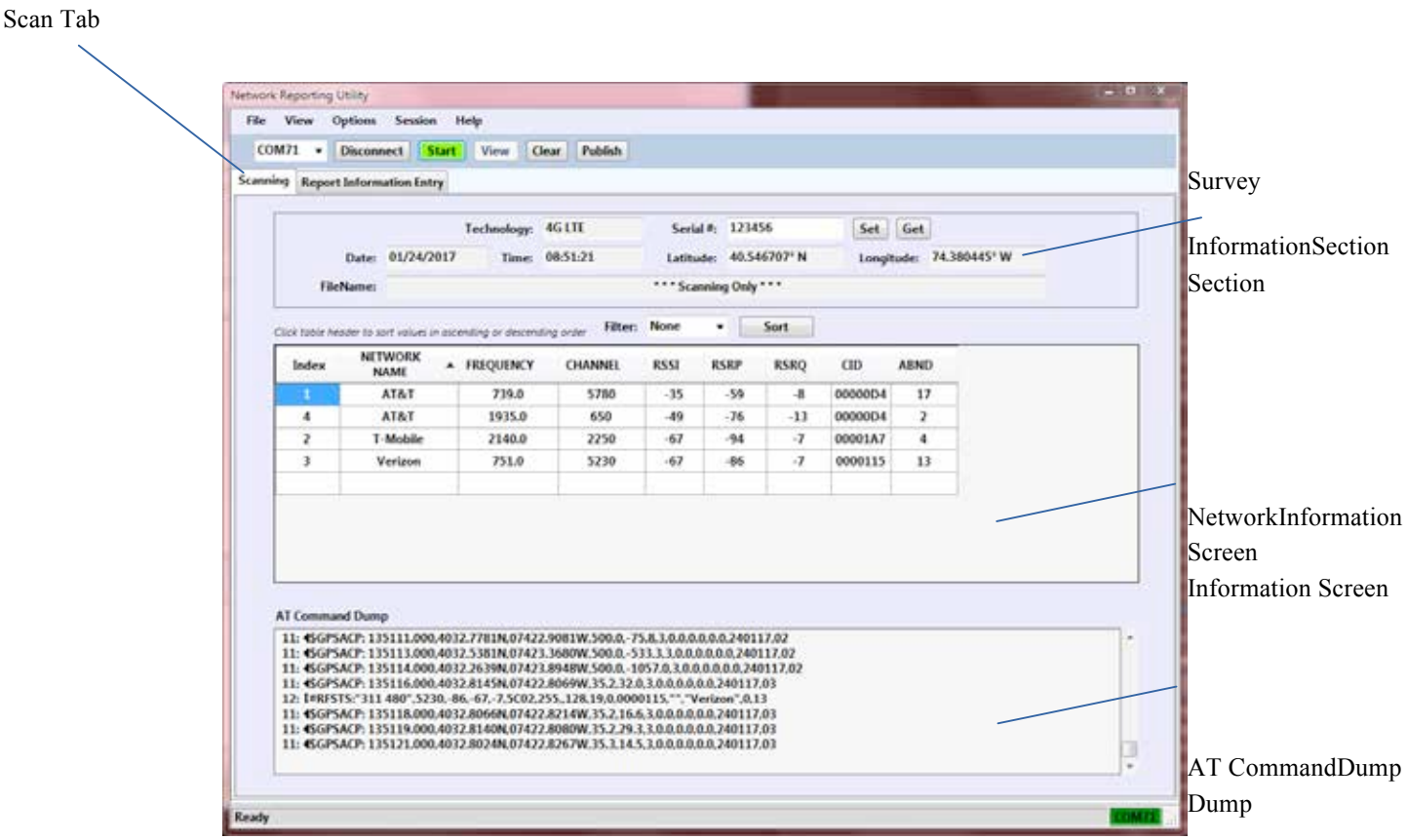


Figure 1. The main scan screen of the Network Report Utility.

View Menu

Show AT Command Dump

This is a check selection which makes the AT command dump window appear at the bottom of the screen.

Options Menu

Save Survey Information

This selection saves the boilerplate information for the report such as the Squid serial number, the company name, the name of the field technician, the field technician's supervisor, the job number and the survey location. There is also a button on the Report Information Tab that does this.

The latitude and longitude are provided automatically in the report so it is not necessary to include this information.

Report Information Tab

Save Survey Information button

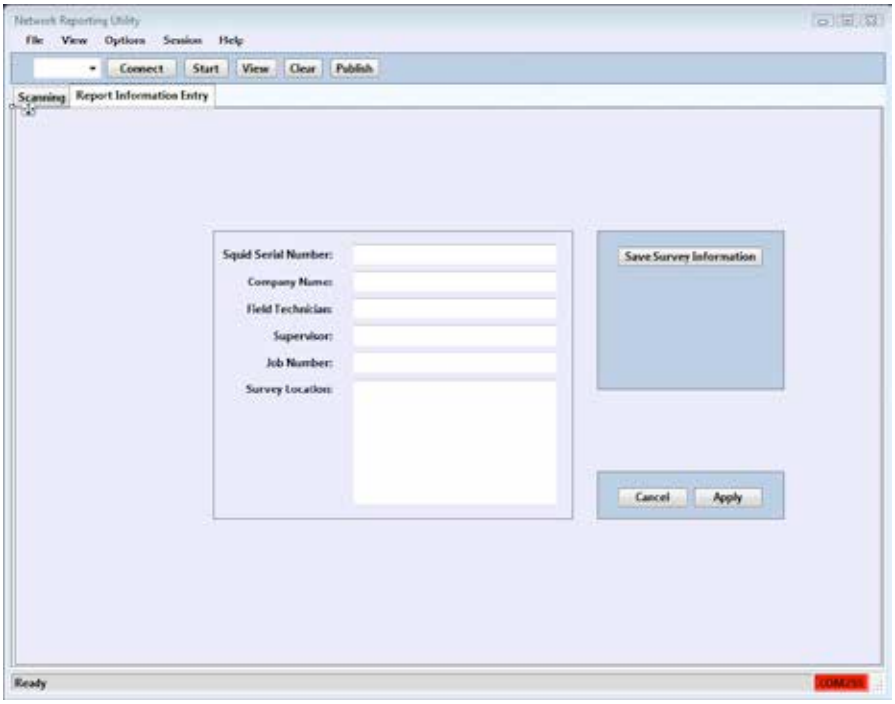


Figure 2. The Report Information Entry screen.

Session Menu

Connect
This selection connects the software to the Squid unit.

Start
Start begins the survey data collection.

Help Menu

Register Squid

Use this selection to register the Squid unit to work with the software.

About Network Report Utility

The About screen has information about the Berkeley Varitronics Systems website and the Support website page as well as phone and fax numbers for BVS.

Toolbar Buttons

The COM Port dropdown box
This control selects the COM port for connecting to the Squid unit.

The Connect button
This button connects the program to the Squid unit. It will alternately display Connect and Disconnect when pressed.

The Start button
This button starts the data collection and alternately displays Start and Stop.

The View button
This button opens the currently published survey report using the currently defaulted notepad program.

The Clear button
This button clears the screen of survey data.

The Publish button
This control publishes all the survey information to a comma separated value file which can be seen in a text editor or imported into a spreadsheet program eg. Microsoft Excel. Sample report output is shown below.

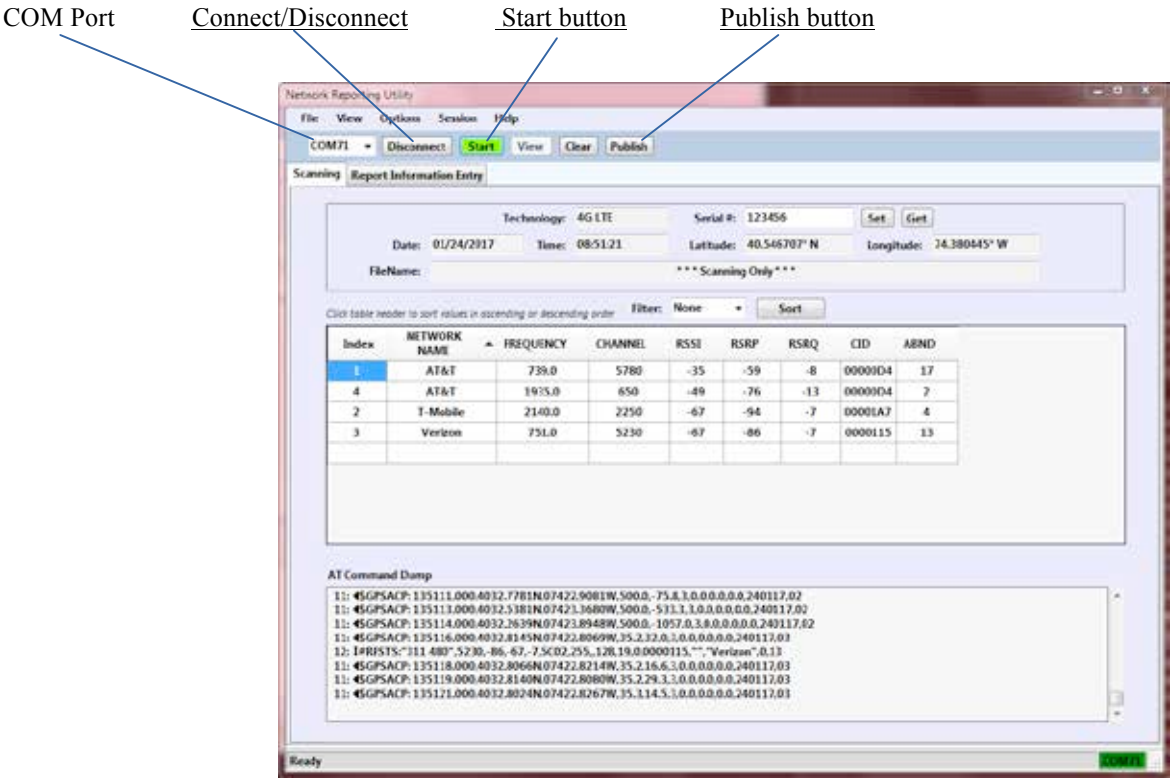


Figure 3. Main screen showing button locations

Quick Start Guide

Start the Report Utility.

Connect the USB cable to the Squid.

Click Connect on the toolbar or Session/Connect

Sample Report Output

```
Network, Information, Report
   Software Version, 1.0.6232.19726
         Technology, 4G LTE
Squid Serial Number, 123456
       Company Name, QRS Telecom
   Field Technician, Floyd R. Turbo
         Supervisor, Johnny Carson
         Job Number, 1234
               Date, 01/23/2017
               Time, 13:00:59

    Survey Location,
------------------,
           Latitude, 38.000000° N
          Longitude, 74.000000° W
            Address, 255 Liberty Street
                   , Metuchen, New Jersey

Index, Network,          Frequency,   Chan, RSSI, RSRP, RSRQ,  CID,      ABND
000001, AT&T            ,    739.0,  5780,  -33,  -58,   -8,   00000D4,   17
000003, AT&T            ,   1935.0,   650,  -51,  -75,   -8,   00000D4,    2
000004, T-Mobile        ,   2140.0,  2250,  -62,  -91,   -8,   00001A7,    4
000002, Verizon         ,    751.0,  5230,  -70,  -90,   -7,   0000115,   13
```