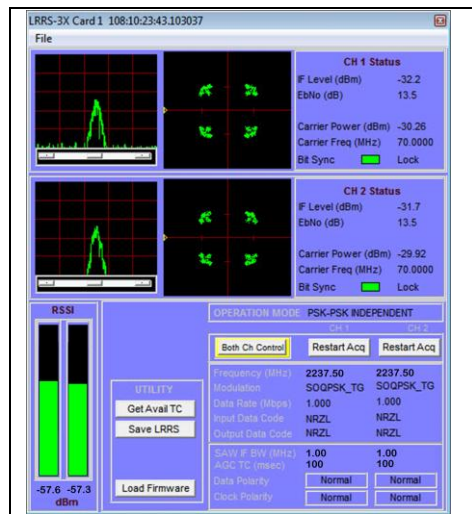




LDPS/LRRS Network Control

Quick Start Guide



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1 Introduction

1.1 General Information

This guide was created to familiarize the user with the operations of the network controls of the Lumistar Data Processing System (LDPS) software as it pertains to the Lumistar Range Receiver System (LRRS) software. This document is primarily focused on providing a quick guide to setup server/client operational parameters associated with each software package. This manual should be used in conjunction with the LDPS and LRRS Technical Manuals for additional details.

1.2 Software Description

The Lumistar LRRS software application is typically used to interface and control our receiving system hardware and the LDPS application is used to interface with data collection and processing functions of telemetry data. Network interfacing is a natural part of processing, sharing and distributing data which makes it a necessity of the LDPS software package. In an auxiliary role, LDPS has been provided with the ability to interface to the basic functions of the LRRS application via a client-server configuration to allow the following receiver setup functions via a network connection:

- Tune an RF Downconverter frequency
- Selection of the demodulation mode
- Selection of the receiver data rate
- Selection of the combined or independent mode
- Setting the demodulator PCM input code
- Setting the demodulator PCM output code
- Selecting the data and clock polarities
- Setting of receiver parameters such as the AGC time constant and filter selections

There are many additional controls that are available as a part of the LRRS application software. Only the most common are available via the LDPS client interface.

In addition to the control functions, the LDPS client interface to the LRRS application allows for status of the receiver system hardware. This includes the following status items:

- IF Spectrum Display
- IQ Display (PSK mode only)
- Bit Sync Lock
- IF Signal Strength
- Eb/No Estimate
- Carrier power
- Carrier frequency
- FM Peak Deviation

Interface provisions are via UDP or TCP.

2 Software Setup

To utilize the network interface, there are setup requirements for both the LDPS and LRRS software applications. The client control is a function of the LDPS software so the LDPS software must be installed at the remote control/status location. The LRRS application acts as the server and thus must be installed at the location which contains the demodulator and RF downconverter hardware.

2.1 LRRS Server Software Setup

To utilize the network interface, there are setup requirements for both the LDPS and LRRS software applications. The client control is a function of the LDPS software so the LDPS software must be installed at the remote control/status location. The LRRS application acts as the server and thus must be installed at the location which contains the demodulator and RF downconverter hardware.

2.1.1 LRRS Server Network Setup

The LRRS software must be configured to provide the network interface to the LDPS server. To configure the network settings, select the *SYSTEM - NETWORK CONFIGURATION* tab. The resulting page will appear as shown in Figure 1. On this tab select the "Enable Network" button as well as the "Allow Network Control". Enter the Client IP Address. It is suggested that the UDP port number remain 33170 but this setting can be changed to accommodate system considerations. The rate at which the data is provided to the client can be adjusted with the slider provided. Once all adjustments are complete, the changes can be activated by selecting the "Accept" button.

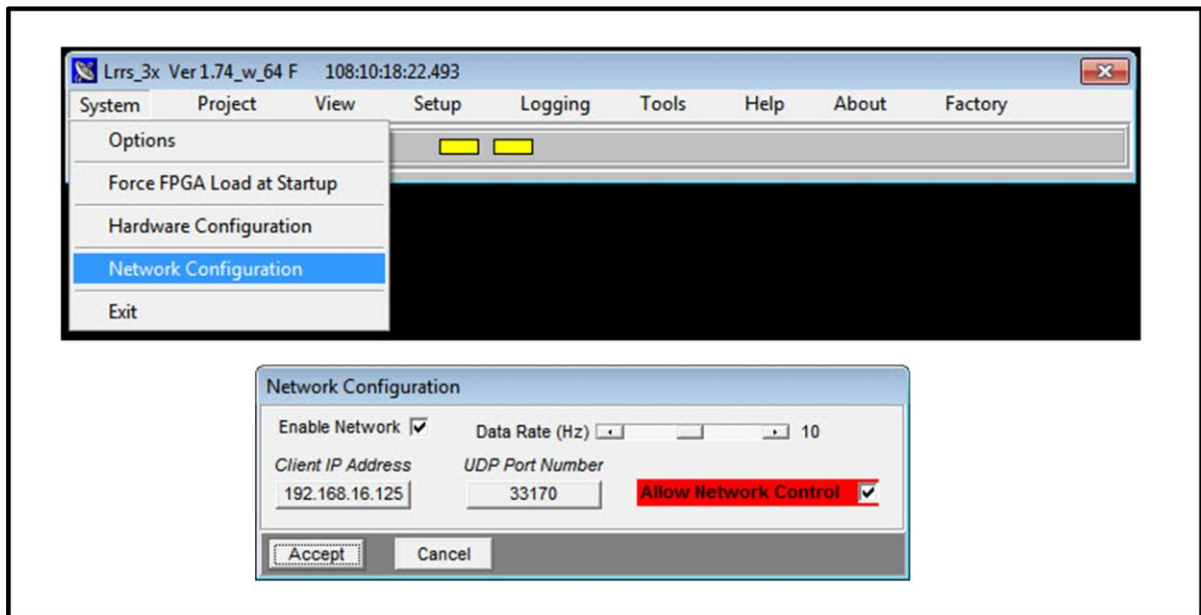


Figure 1. LRRS Network Setup

2.2 LDPS Client Control/Status Software Setup

Install the LDPS software package on the client computer. It is suggested that the user select the suggested default install options when prompted. If installing the 64-bit installation, select the option to install unsigned drivers when prompted. Follow the configuration steps that follow.

2.2.1 LDPS Device Manager

Once installed, the LDPS software must be configured to provide the LDPS client. To do this, select the *SYSTEM - DEVICES - MANAGE* menu selection and select the "Lrs3xN_8x" ENABLE as shown in Figure 2. The "Update" button will likely require selection to activate the option selection. When active, the "Lrs3xN_8x" button will be surrounded by a green outline as shown.

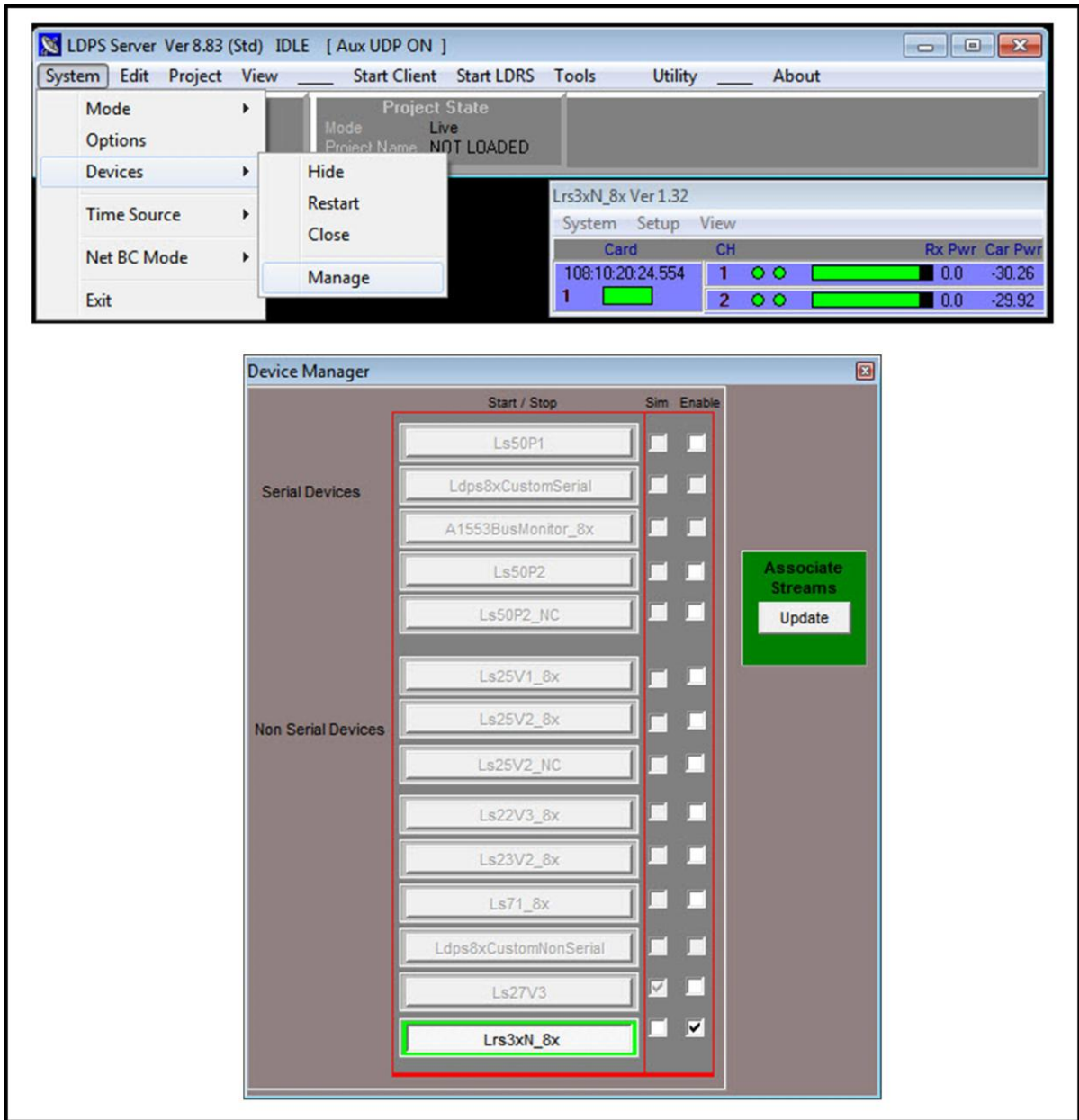


Figure 2. LDPS Device Manage Tab

2.2.2 LDPS Network Setup

The LDPS software must be configured to provide the network interface to the LRRS server. To configure the network settings, select the *SYSTEM - OPTIONS - NETWORK* tab. The resulting page will appear similar to the view shown in Figure 3. On this tab select the "Use Network" button. Enter the LRRS server IP address in the "Primary Server" menu entry.

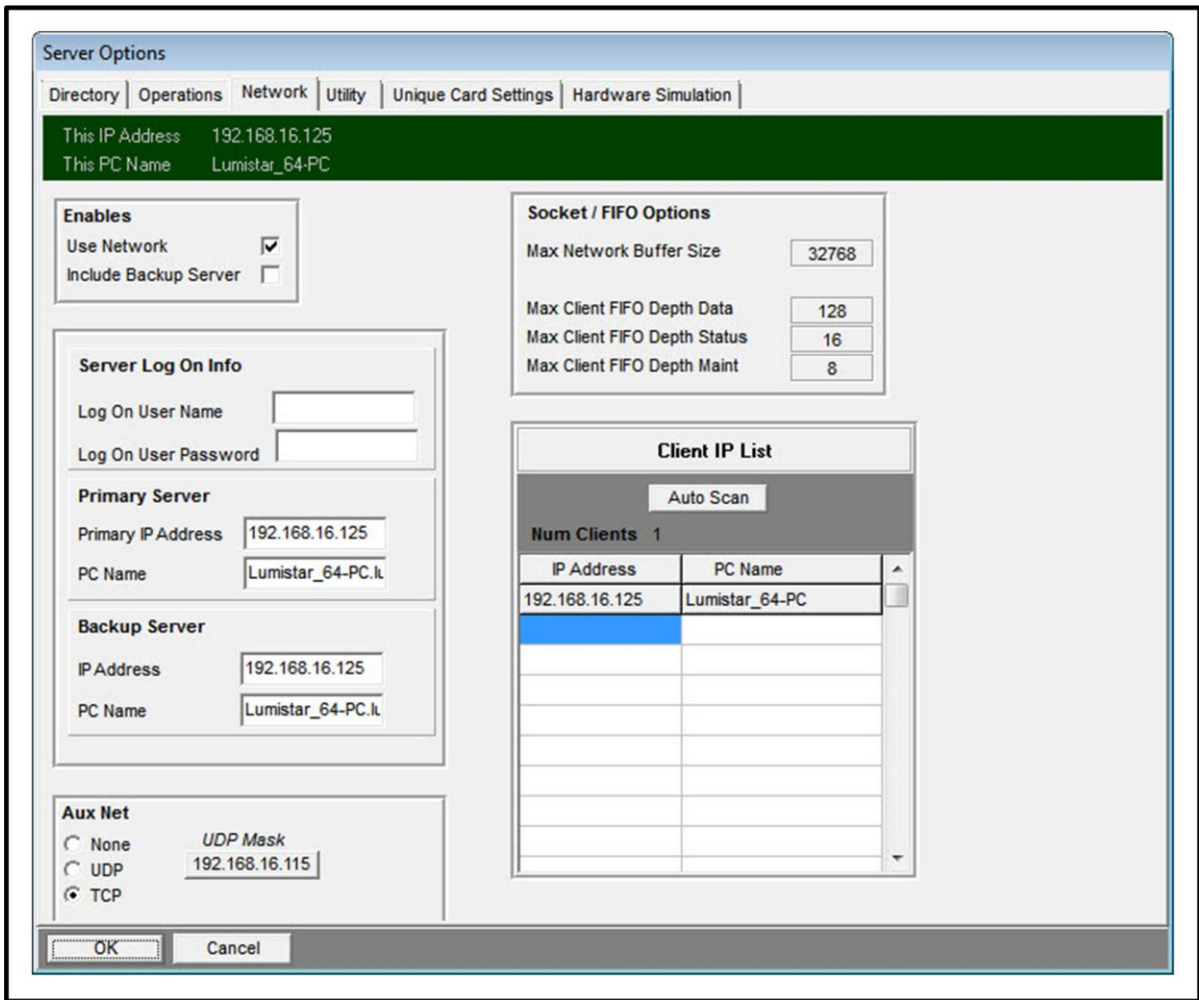


Figure 3. LDPS Server Options Network Setup

2.3 Lrs3xN_8x Client Controls

The main interface to the LRRS server hardware is through the Lrs3xN_8x network client which is launched via the LDPS application. When the interface is active, and data is streaming the following launch window shown in figure 4 will be displayed. The network status will indicate a disconnected state, errors, or lost data by turning red. The status indicator will be green if all connections are functioning normally.

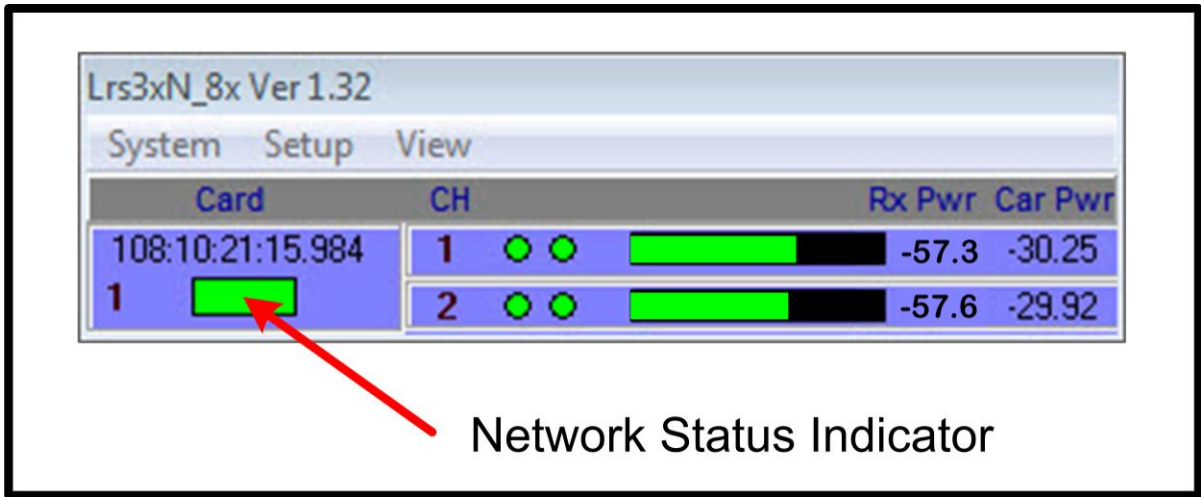


Figure 4. Lrs3xN_8x Client Window

2.3.1 Lrs3xN_8x Network System Controls

The network client requires some system parameters be set by the user. The client *SYSTEM* tab contains three setup selections as shown in Figure 5.

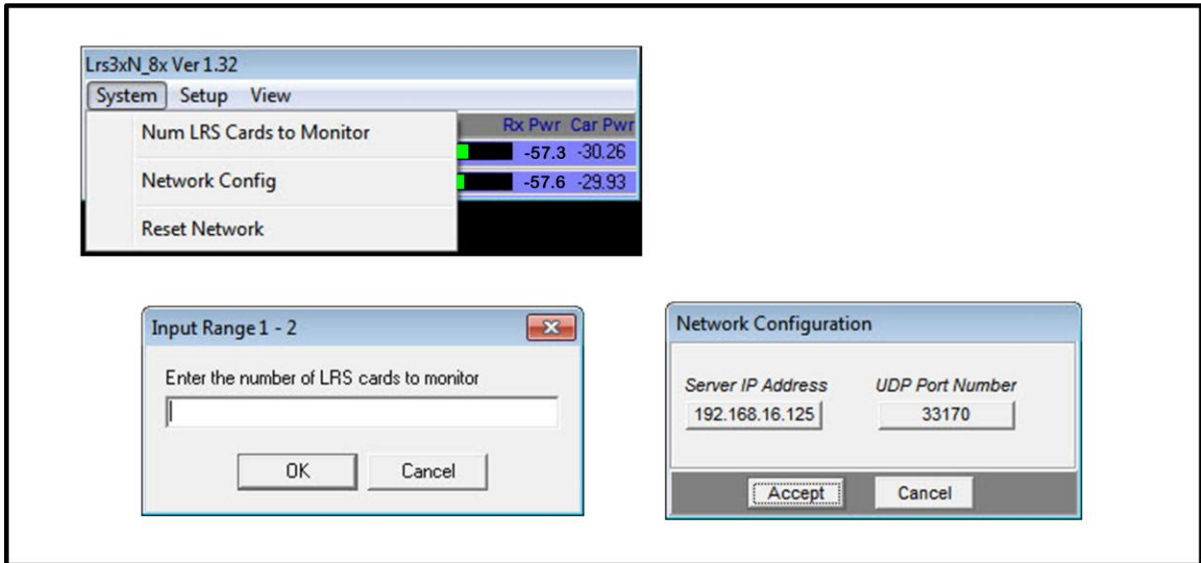


Figure 5. Lrs3xN_8x Client Window - System controls

Num LRS Cards to Monitor – This menu option allows the user to select the number of remote LRRS card pairs (downconverters/demodulator pairings) which are to be controlled and monitored.

Network Configuration – This menu selection allows the user to enter the server IP address and UDP port address. These values must match those set in step 2.1.1. Select the ACCEPT button to activate the settings.

Reset Network – This menu option allows the communications between the server and client to be momentarily reset and restarted in the event of communications errors. This selection may be necessary during the initial setup.

2.3.2 Lrs3xN_8x View Status

The network client allows for the monitoring of various communications parameters. The client *VIEW* tab is shown in Figure 6.

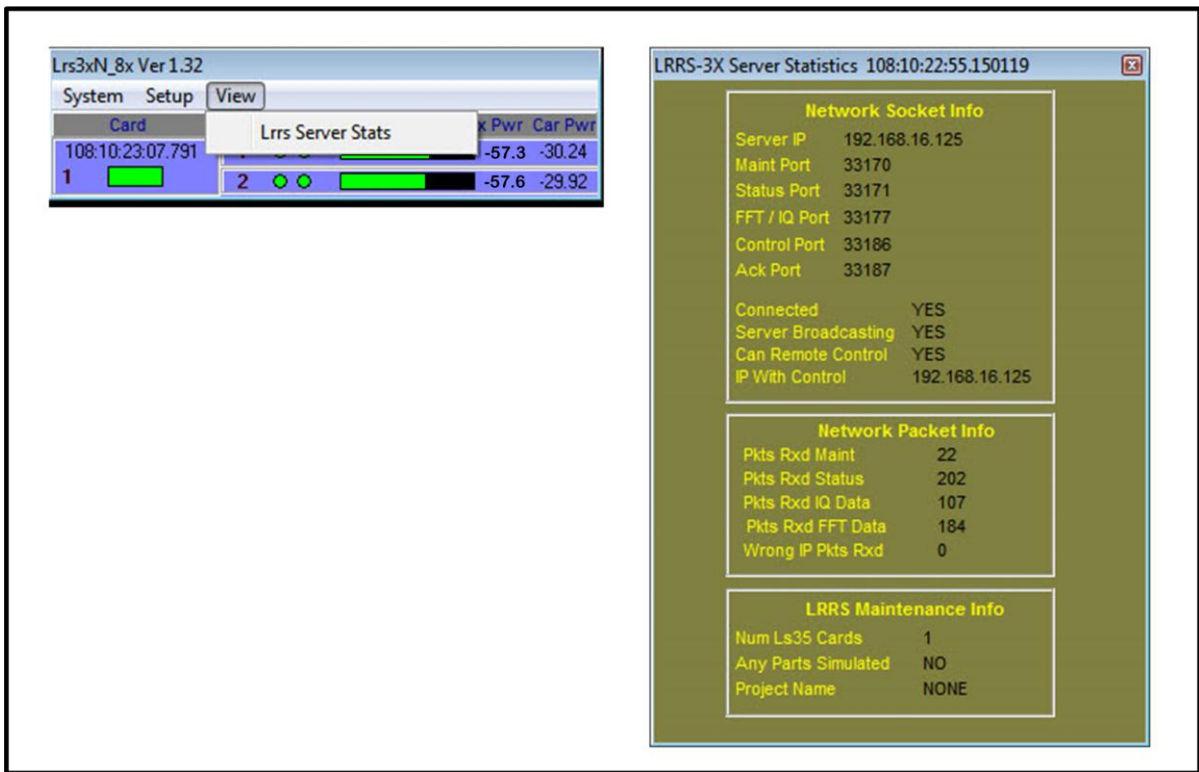


Figure 6. Lrs3xN_8x Client Window - View Status

2.3.3 Lrs3xN_8x Setup Controls

The network client allows for the setup and status monitoring of various LRRS parameters. The client *SETUP* tab is shown in Figure 7. Figure 7 contains a reference key which identifies which items are downconverter related and which ones are related to the demodulator. This key also signifies which display status elements come from which of the LRRS elements. **It is possible to use the network interface with only the demodulator LRRS elements. In this case, the downconverter related display elements will be static.**

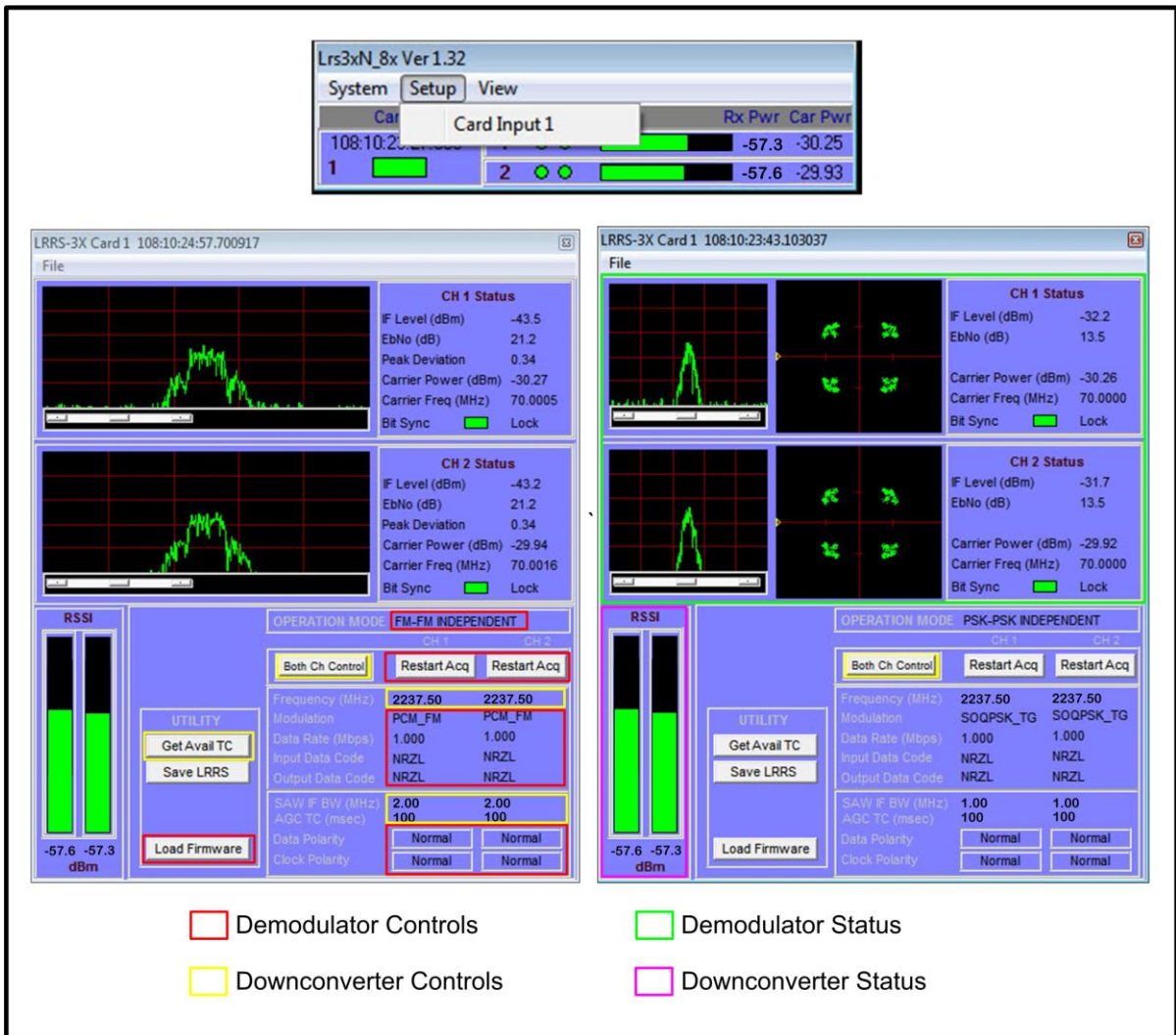


Figure 7. Lrs3xN_8x Client Window - Setup (Status)

2.3.3.1 Lrs3xN_8x Setup Controls

The network client controls are described below:

Operation Mode – Right-click selections in this GUI area allow the user to select the various licensed operational modes of the demodulator. A drop-down list will appear with all licensed modes. The user can select these modes which will cause the appropriate firmware to be initiated.

Both Ch Control – Both receiver channels can be programmed in an identical manner by selecting this GUI option. If this option is selected, indicated by the outline being displayed in green, programming changes to either of the channel controls will be programmed to the alternate channel automatically.

Restart Acq – This menu option allows the user to restart the acquisition mode of the demodulator. The mode will only be functionally if the demodulator is programmed in the FFT carrier acquisition mode.

Frequency (MHz) – The downconverter RF tune frequency can be programmed via this menu selection. A programming window will appear that shows all available tune frequencies available in the downconverter.

Modulation – A list of modulation methods available in the loaded firmware appears in this menu option. The menu selection only controls the demodulation method. Selection of independent versus combined mode are made in the Operation Mode menu area.

Data Rate (Mbps) – The modulated data rate can be programmed in this GUI programming window. The limits to the data rate range will be displayed in the programming window.

Input Data Code – The anticipated PCM input code of the received data is selected in this drop-down menu.

Output Data Code – The desired PCM output code from the demodulator is selected in the drop-down menu.

SAW IF BW (MHz) – The Lumistar series of RF downconverters contain a number of programmable 70MHz IF SAW filter bandwidths. These are programmed based on input PCM code, demodulation selections, and programmed data rate. When used in the LRRS application, these IF bandwidth filters are used primarily as a type of "anti-alias" and adjacent channel rejection filter. They are automatically set as a part of the other programmed values. However, the user does have the ability to override and set these values as desired. If no downconverter is associated with the LRRS functions being controlled this list will be non-functional.

AGC TC (msec) – This menu provides a drop-down list of the available AGC time constants available as a part of the RF downconverter. If no downconverter is associated with the LRRS functions being controlled this list will be non-functional.

Data Polarity – The data polarity of the demodulator can be selected via this GUI control as either normal or inverted.

Clock Polarity – The clock polarity of the demodulator can be selected via this GUI control as either normal or inverted.

Load Firmware – The digital demodulation engine is loaded as a run-time functions with specific firmware based on user selections. This GUI button allows the user to reload this firmware which in turn resets all firmware parameters.

Get Available TC – During system boot, the available AGC time-constants are loaded from the downconverter configuration memory into the GUI software. To update this list, select this GUI control.

Save LRRS – This menu option allows setups to be saved on the LRRS server.

File - Save – This menu selection allows the LDPS application to save the present configuration for future recall.

File - Save As – This menu selection allows the LDPS application to save and name the present configuration for future recall.

File - Recall – This menu selection allows the LDPS application to recall past saved Lrs3xN_8x configurations.

2.3.3.2 Lrs3xN_8x Status Display

The network client status items are described below:

Spectrum Analysis – Both IF channel spectrums are displayed for the user in the client GUI window. The offset of each channel can be controlled via the provided slider controls.

IQ Display – When the demodulation source is set to any PSK mode, the IQ displays for each channel will be provided. These displays are useful in determining the signal integrity of the demodulated signal. They indicate IQ phase crossings as well as distortion and noise characteristics of the channel.

IF Level (dBm) – The IF power level is provided for each channel.

Eb/No (dB) – The demodulator provides an Eb/No estimate for each of the channels. This estimate provides the user with information concerning the data integrity of the bit detections being made by the demodulator.

Peak Deviation – In the FM mode, the peak deviation FM index is calculated by the demodulator and provided to the user. The IRIG specification suggests that the FM peak index be set to 0.35. Indexes outside this range are considered to be outside the suggested optimal ranges.

Carrier Power (dBm) – The demodulator calculates the carrier power as a function of its need to perform CNR and SNR measurements. This GUI status provides updates at an approximate 1 second rate.

Carrier Frequency (MHz) – The digital demodulator performs Automatic Frequency Controls (AFC) for carrier tracking. In the performance of these functions, calculations are

performed on the incoming spectrum and the derived carrier center frequency is provided to the user via this status.

Bit Sync Lock – The bit slicer of the digital demodulator performs bit and associated clock resynchronization functions. Once a lock condition exists, the lock detect window is displayed in green. If no lock condition exists, a yellow lock detect indication is provided.

RSSI (dBm) – The Lumistar series of RF downconverters provides a signal strength indication of the incoming RF channel signals. This data is provided to the user as a linearized dBm value for each channel. If no downconverter is associated with the LRRS functions being controlled this status will be static and thus of no meaning.