iDirect Modem

Interface and Reference Guide
Revision R11.10.0

Documentation of the interface between the iDirect modem and the AvL Technologies AAQ antenna controller, reference information, and troubleshooting guide.

AvL Technologies
900-159-004

Revision History

Date	Revision	Revision By	Approved By	Revision Description
4/29/2015	1.0	M.P.		Initial Release for R11.2
8/18/2015	1.1	WL		Update for R11.4 with Config Parameters
1/14/2016	11.5.0	WL		Update for R11.5 and change in revision sequence
6/30/16	11.6.0	WL		Update for R11.6
11/14/16	R11.8.0	AS		Updated for R11.8
3/24/17	R11.9.0	WL/DM	JF	Updated for R11.9, new template
2/5/18	R11.9.1	IH	MF	Section 3.3 changed Step Pattern Velocities and Steps max values from 5 to 0.5, changed Step Pattern Steps recommended from 1 to 0.1
10/19/18	R11.10.0	TV		Updates for R11.10

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Introduction

This document describes the concepts required to use the iDirect module as part of the AAQ Controller. This module directly supports iDirect modems Evolution X3, X5, X7, and the Evolution 8000 Series. It is recommended that older iDirect modems should be upgraded to software version iDX 3.5.

iDirect Evolution modems are an IP-based satellite communications system engineered to deliver the highest quality broadband connectivity. The Platform is built on DVB-S2/ ACM with Adaptive TDMA and multiple technologies to allocate bandwidth efficiently over distributed networks, while automatically adjusting to dynamic traffic demands and changing network conditions.

Setup Guide

2.1. Hardware

2.

- iDirect Modem
  - o Evolution X3
  - o Evolution X5
  - o Evolution X7
  - o Evolution 8000 Series
- AvL AAQ Antenna System

2.2. Software

Ensure that the Remote Client, ROM, and device module are at or above the versions shown in Figure 1:

Filename	Type	Version	Build
AAQRemote	Remote Client	R11.10	410
AAQ.rom	ROM File	R11.10.0.0	0
AAQ.conf	Config File	3341	
Azimuth RIOM	RIOM		444
Elevation RIOM	RIOM		444
Polarization RIOM	RIOM		432
Navigation RIOM	RIOM		454
Digital IO RIOM	RIOM		433
/home/root/HughesHN.D11.10.0-3.mod	Modem	D11.10.0.3	3
/home/root/GPSBroadcast.D11.10.0-2.mod	Utility	D11.10.0.2	2
/home/root/iDirect.R11.10.0-0.mod	Modem	R11.10.0.0	0
/home/root/RSL1.D11.10.0-3.mod	Modem	D11.10.0.3	3

Figure 1 – Version Info

Note: It is recommended that older iDirect modems should be upgraded to software version iDX 3.5.

2.3. Hardware Connection

Connect the AAQ antenna controller to the iDirect modem through the desired means. The AAQ controller supports serial (RS232) and Ethernet communications to the iDirect modem and can be configured to use either depending on the necessary networking scheme.

2.3.1. Serial Communication Connection

To communicate with the iDirect modem through a serial connection, connect the serial cable from the AAQ antenna system to the Console port on the modem. Connect power to all devices. Confirm that the serial port settings are correct per section 3 of this document.

Figure 2 – Serial Setup

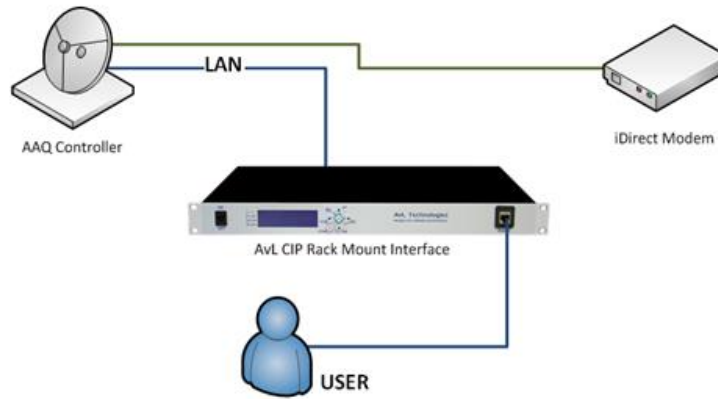### 2.3.2. Ethernet Communication Connection

When setting the system to communicate by Ethernet, connect both the controller and the iDirect modem to the AvL CIP or other network switch so the controller can query the modem over the network. Ensure power is connected to each device. Confirm that the Ethernet settings are correct per section 3 of this document.
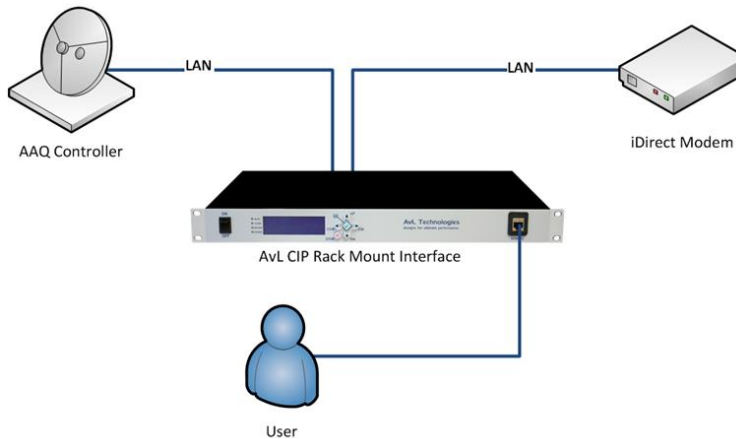
Figure 3 – Ethernet Setup

When setting the system to communicate by Ethernet, it is important to make sure the controller has a network path to the iDirect modem so the controller can query the modem over the network. The example shown below represents a typical installation.

Path
Main Window → File → Settings→ AAQ Network Interface Options
Level 1
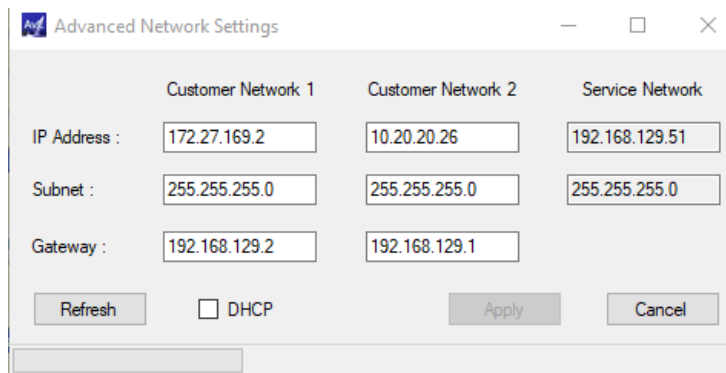
Figure 4 - AAQ Network Interface Option Window

3.

Configuration

3.1. Core Configuration Items

Modify the following configuration items to enable interaction of the controller with the modem. These configuration items can be accessed using the AAQRemote GUI. The configuration varies depending upon the physical connection method (Ethernet or serial).

Path
Main Window → View → Configuration →Core
Level 4
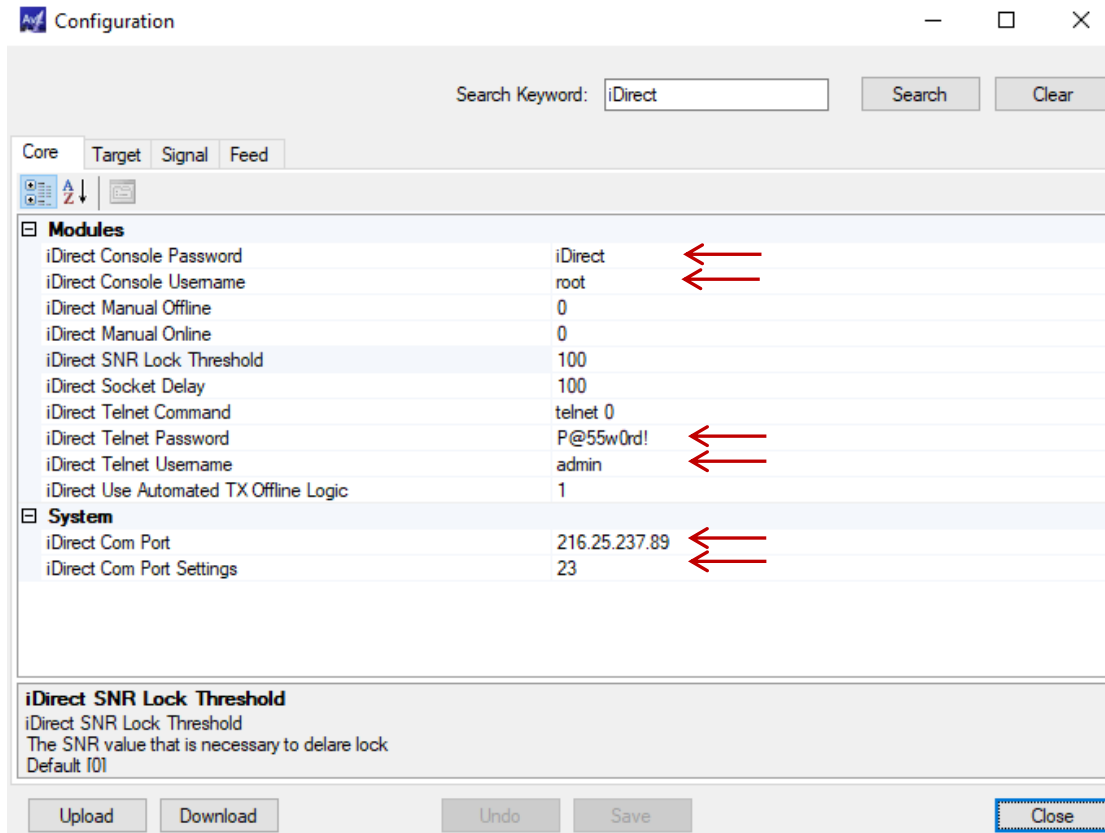
Figure 5 - Core Configuration Window, System Configuration

3.1.1. Ethernet Setup

If configuring to communicate over Ethernet set the iDirect module to use the IP address and Port Number of the iDirect modem.

Long Name	Level	Type	Value Range	Documentation
iDirect Com Port	4	String	iDirect IPv4 Address	The factory set IPv4 address of the iDirect modem
iDirect Com Port Settings	4	String	23	The standard Telnet Com Port

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3.1.2. Serial Setup

If configuring to communicate over Serial, set the iDirect module to use the RS 232 com port and Port Number of the iDirect modem.

Long Name	Level	Type	Value Range	Documentation
iDirect Com Port	4	String	/dev/ttyO0 or /dev/ttyO3	The computer device filename for the communications port used
iDirect Com Port Settings	4	String	BaudRate, DataBits, Parity & StopBits	The communications parameters for the comm port in the form of BaudRate, DataBits, StopBits, Parity (i.e. 9600 8 1 0) where parity values are 0 for none and 1 for even.

3.1.3. iDirect Specific Configuration

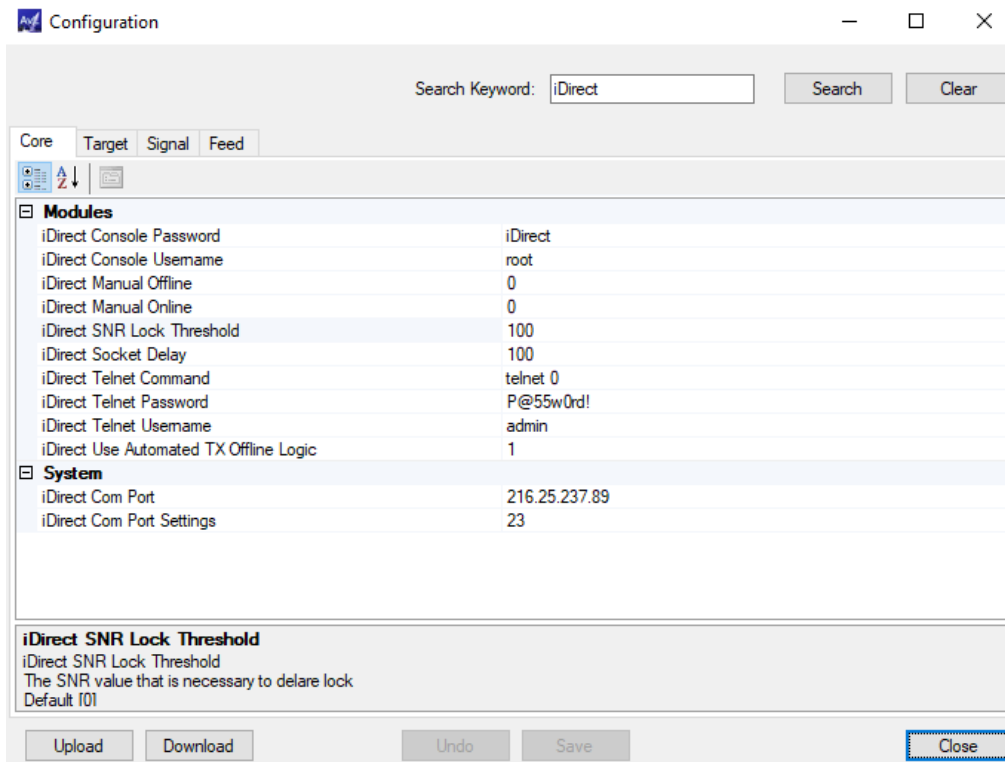| Path |
|---|
| Main Window → View → Configuration →Core |
| Level 4 |

Figure 6 - Core Configuration Window, Module Configuration

Long Name	Level	Type	Value Range	Documentation
iDirect Console Password	1	String	-	This is the Console Password used to log into the modem
iDirect Console Username	1	String	-	This is the Console Username used to log into the modem
iDirect Manual Offline	4	String	-	This is a flag to manually command the modem to go offline. Telnet must be active. 0 = disabled 1 = enabled
iDirect Manual Online	4	String	-	This is a flag to manually command the modem to go online. Telnet must be active. 0 = disabled 1 = enabled
iDirect SNR Lock Threshold	1	String	-	The SNR value that is necessary to declare lock
iDirect Socket Delay	1	String	-	The amount of delay to add to the socket read in microseconds
iDirect Telnet Command	1	String	-	The Telnet Command the iDirect requires to begin a Telnet session
iDirect Telnet Password	1	String	-	This is the Telnet Password used when accessing Telnet within the modem
iDirect Telnet Username	1	String	-	This is the Telnet Username used when accessing Telnet within the modem
iDirect Use Automated TX Offline Logic	1	Value	0-1	The setting to use the automated transmit offline logic to protect against adjacent satellite interference. 0 = Do not use transmit logic 1 = Use transmit logic. Perform offline commands

3.2. Target Configuration Items

The two iDirect target configuration items can be accessed using the AAQRemote GUI.

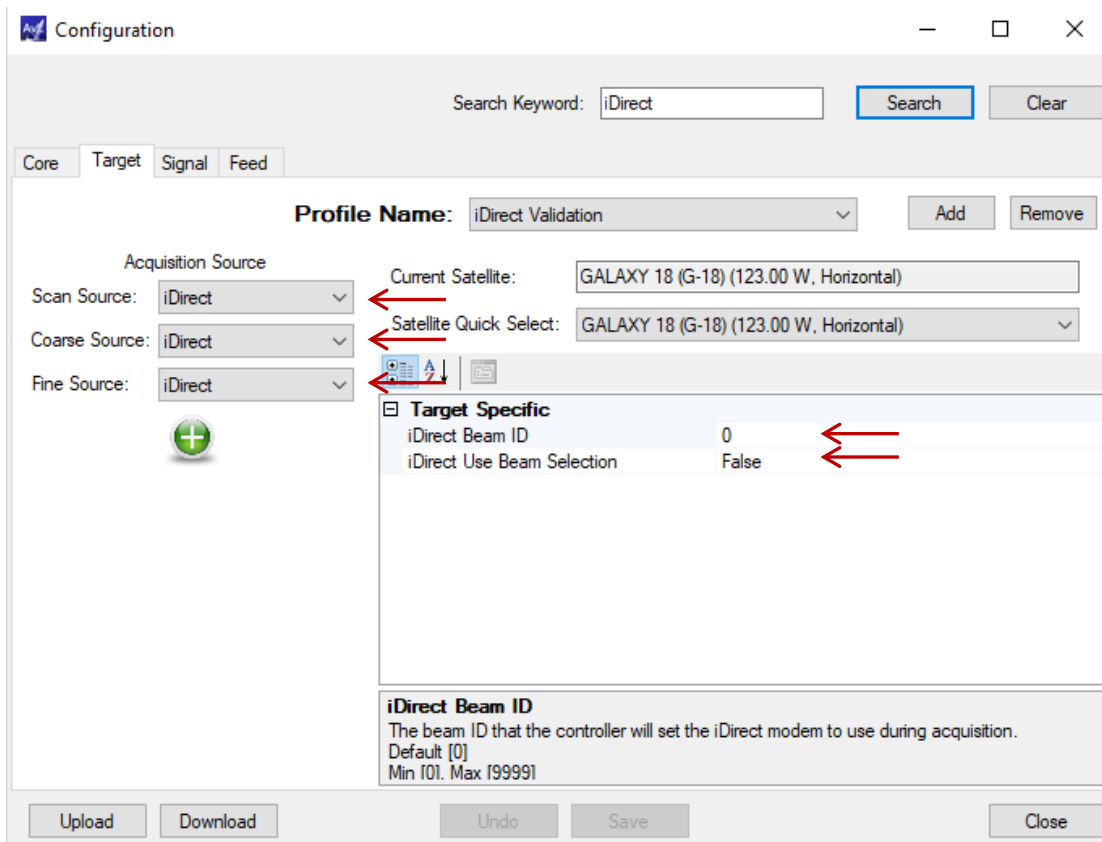| Path |
|---|
| Main Window → View → Configuration →Target |
| Level 1 |

Figure 7 - Target Configuration

Long Name	Level	Type	Value Range	Documentation
iDirect Beam ID	1	Value	0 - 9999	The Beam ID the controller will set the iDirect modem to use during acquisition if 'iDirect Use Beam Selection' is set to 'True'
iDirect Use Beam Selection	1	Choice	True - False	Set this switch to True to have the controller control the Beam ID the iDirect modem will use for acquisition
Scan Source	1	Choice	All available signal sources	The Signal Source used to Scan for the Target satellite. Set this to iDirect.
Coarse Source	1	Choice	All available signal sources	The Signal Source used to Coarse Peak on the Target satellite. Set this to iDirect.
Fine Source	1	Choice	All available signal sources	The Signal Source used to Fine Peak on the Target satellite. Set this to iDirect.

3.3. Signal Configuration Items

The controller polls the modem for signal information that is used to correctly point the antenna. In this case the modem's SNR value is used to peak the signal at its maximum. The following are recommended settings to ensure the movement of the physical antenna is not faster than the polling speed of the signal data.

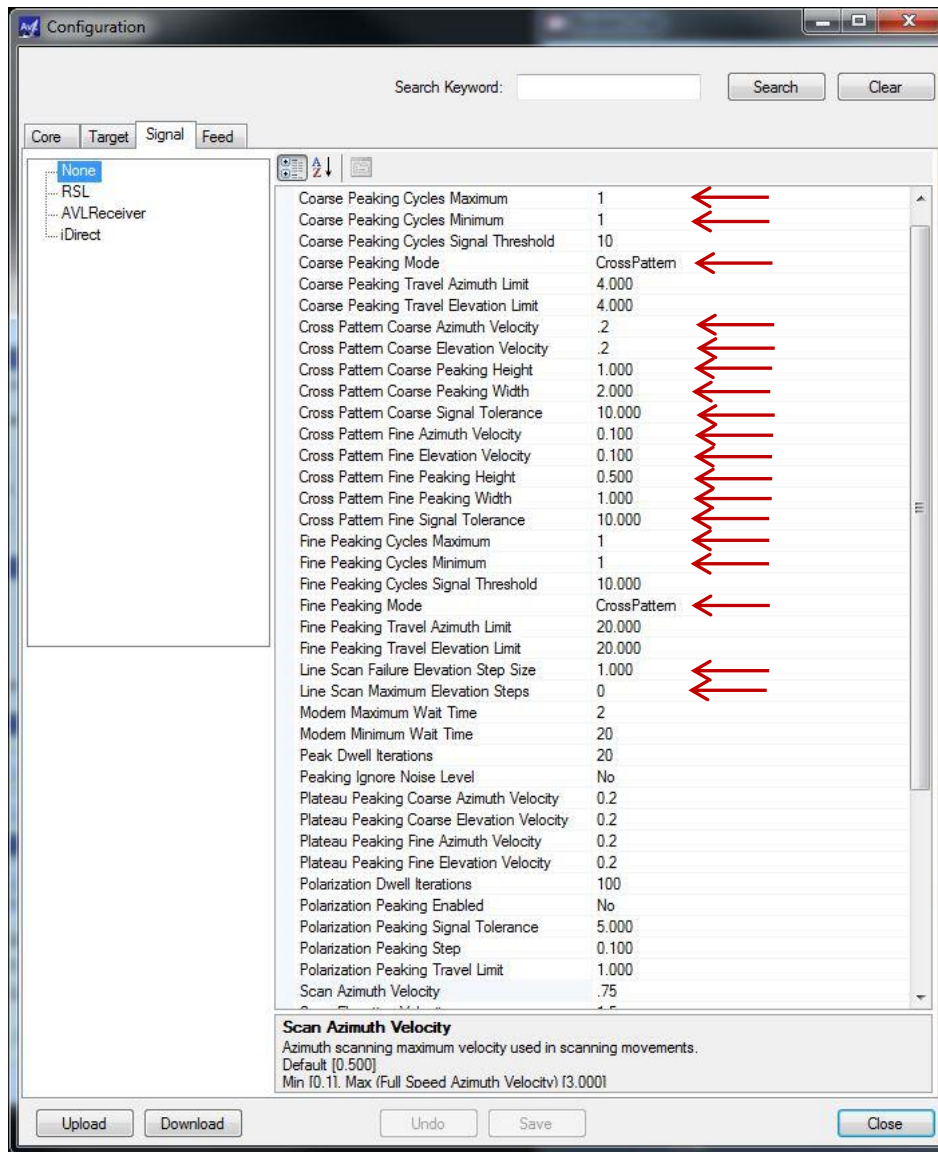| Path |
| --- |
| Main Window → View → Configuration →Signal |
| Level 4 |

Figure 8 - Signal Configuration Window

Long Name	Level	Type	Value Range	Recommended Value	Documentation
Coarse Peaking Cycles Maximum	4	Integer	0 to 10	1	The maximum number of cycles to attempt for coarse peaking.
Coarse Peaking Cycles Minimum	4	Integer	0 to 10	1	The minimum number of cycles to attempt for coarse peaking. [Note: If set to 1 Coarse Peaking Cycles Maximum will be ignored]
Coarse Peaking Mode	4	Choice	None, CrossPattern, StepPatten, PlateauPeaking	CrossPattern	Selection of the peaking method to use for coarse peaking routines
Cross Pattern Coarse Azimuth Velocity	4	Float	.02 to 1	0.2	Azimuth velocity in degrees/sec for coarse peaking
Cross Pattern Coarse Elevation Velocity	4	Float	.02 to 1	0.2	Elevation velocity in degrees/sec for coarse peaking
Cross Pattern Coarse Peaking Height	4	Float	.25 to 5	1	Height in degrees to scan during a coarse cross pattern peaking function
Cross Pattern Coarse Peaking Width	4	Float	.25 to 5	2	Width in degrees to scan during a coarse cross pattern peaking function
Cross Pattern Coarse Signal Tolerance	4	Float	0 to 1000	10	Signal degradation amount before a scan stops
Cross Pattern Fine Azimuth Velocity	4	Float	0.02 to 0.5	0.1	Azimuth velocity in degrees/sec for fine peaking
Cross Pattern Fine Elevation Velocity	4	Float	0.02 to 0.5	0.1	Elevation velocity in degrees/sec for fine peaking

Cross Pattern Fine Peaking Height	4	Float	0.25 to 5.0	0.5	Height in degrees to scan during a fine cross pattern peaking function
Cross Pattern Fine Peaking Width	4	Float	0.25 to 5.0	1.00	Width in degrees to scan during a fine cross pattern peaking function
Cross Pattern Fine Signal Tolerance	4	Float	0.0 to 1000	10.0	Signal degradation amount before a scan stops
Fine Peaking Cycles Maximum	4	Float	1 to 10	1	The maximum number of cycles to attempt for fine peaking
Fine Peaking Cycles Minimum	4	Float	1 to 10	1	The minimum number of cycles to attempt for fine peaking [Note: If set to 1 Fine Peaking Cycles Maximum will be ignored]
Fine Peaking Mode	4	Choice	None, CrossPattern, StepPatten, PlateauPeaking	CrossPattern	Selection of the peaking method to use for fine peaking routines
Line Scan Failure Elevation Step Size	4	Float	0.0 to 5.0	1	The amount of each El step to make when an Az scan fails
Line Scan Maximum Elevation Steps	4	Float	1.0 to 50	0	Initial scan plus the number of El steps to make when an Az scan fails

3.4. Feed Configuration Items

4.

There are not Feed configuration items associated with this module.

Functional Overview

When properly configured, the iDirect modem is fully integrated into the AvL AAQ's acquisition process, and can be used as a signal source to acquire and track on satellite signals. Once the target satellite has been found, the modem will log into the network and be ready to send traffic.
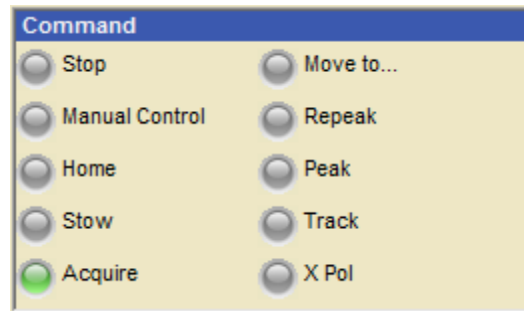
4.1. Acquisition Process

Figure 9 - Acquire Command

1. Power up the antenna

2. Command the antenna to acquire

    The AAQ will initialize sensors, read the compass, then proceed to the first scan point

3. The antenna detects a lock from the modem and stops

    The Modem has detected the satellite carrier

    The AAQ has stopped its scan

4. The AAQ will coarse peak back to the signal

    This is the initial coarse peak that will move through the entire beam

5. Once coarse peaking has been completed, fine peaking will begin

    This fine peaks the signal using small, slow movements

6. AAQ will stop movement

    The AAQ has enabled transmit on the modem

    The Modem will log into the network and be ready to send traffic

4.2. Sensor Outputs

Path
Main Window → View→ Sensor Output
Level 0

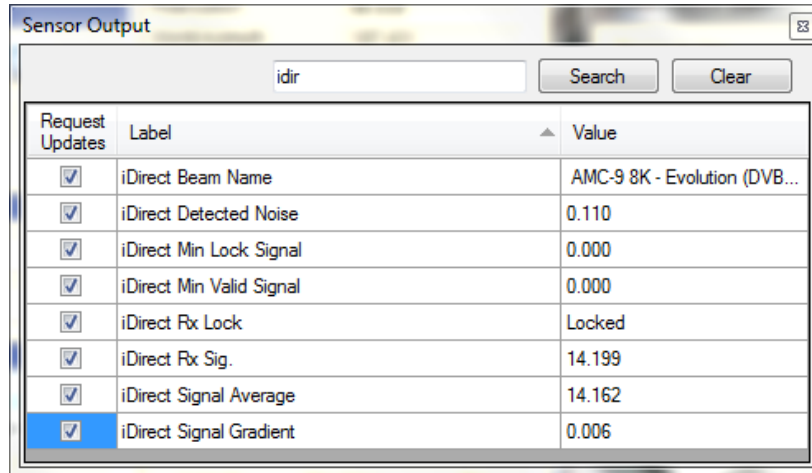Check the boxes beside any Sensor Outputs you wish to view for monitoring operations.

Figure 10 – Sensor Output

The table below describes the Sensor Outputs relevant to this module

Item	Description
iDirect Beam Name	If entered, this is the customers name for each beam in a network.
iDirect Detected Noise	A measure of unwanted signal power used for calculating the SNR (Signal Noise Ratio)
iDirect Min Lock Signal	Not used in iDirect R11.9 – Display zero
iDirect Min Valid Signal	Not used in iDirect R11.9 - Display zero
iDirect Rx Lock	Flag that indicates whether iDirect unit has declared carrier lock.
iDirect Rx Signal	Receive signal strength as read from modem.
iDirect Signal Average	Readout of average signal as read from AAQ
iDirect Signal Gradient	Mathematical approximation of signal change over time in coordination with "iDirect Gradient Sample Time" config. Item as read from AAQ.

4.3. Module Window

4.3.1. Device Window

From the AAQRemote GUI, open the Device Window. The module returns data from its communications in this window.
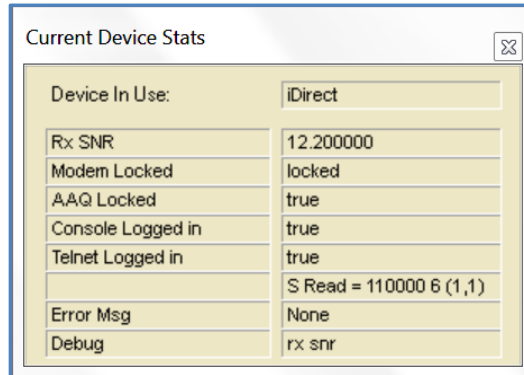
Path
Main Window → View→ Device Window
Level 0

Figure 11 – Device Window

Item	Description
Rx SNR	The Signal to Noise Ratio reported by the modem.
Modem Locked	The locked status of the iDirect modem.
AAQ Locked	The locked status of the controller.
Console Logged in	A true or false indicator that shows if the controller has successfully logged into the console interface.
Telnet Logged in	A true or false indicator that shows if the controller has successfully logged into the telnet interface
Error Msg	Displays the current error message: None = No issues Port size=X Set size=Y = User has not provided network/com settings Bad Write to Modem = Controller was not successful sending data Comm. Timeout = Controller did not receive data from the modem
Debug	Displays debug information such as a sample of the string sent to the modem.
Modem Locked	The locked status of the iDirect modem.

4.3.2. Device Control Window

5. A Device Control Window is not needed for monitoring operation and is not included in the software.

Issues and Troubleshooting

Issue	Description	Corrective Action
AAQ will not communicate to Modem	Device Window does not say "iDirect" at the top	Check that the module has been installed. This can be done through the AAQRemote GUI's Help→Version Info. Check that the iDirect is configured as

		the Scan, Coarse, and Fine Source for the selected Target
AAQ will not communicate to Modem	System in an alarm state "iDirect- Not Ready" Device Window shows "Not Connected" or "Establishing Comms"	Check the configuration items and make sure the iDirect modem module is configured to communicate through Serial or Ethernet. Check Serial or Ethernet cables and connections.
AAQ will not log into the Modem	The Device Window item "Console Logged in" is false.	Check that the Console username and password in the Core Configuration are correct for the modem.
AAQ will not log into the Modem	The Device Window item "Telnet Logged in" is false.	Check that the Telnet username and/or password in the Core Configuration are correct. The appropriate Telnet command should also be identified. The default value "telnet 0" could be modified by the iDirect options file. In some cases this changes the location of the telnet to a specific IP address (ex. "telnet 10.1.1.1").
AAQ will not acquire or loses Signal Lock during Peaking	"All signal sources tried with no valid signal detected" or "Invalid Signal For Peaking" error message reached after an attempted acquire.	Check that the AAQ is communicating with the modem. Check that the correct target profile is selected and that it is configured properly. Check that the Scan and Peaking parameters are configured correctly in the Signal tab of the Configuration Window Check all RF cables and connections.