RFID Console Operation Guide

Revision History

| Version	Author	Date	Changes
1.0	D. Stump	August 2021	Initial Document

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INTRODUCTION

Congratulations on your purchase of a SensArray reader! The Enterprise and Core offer a suite of features that you can customize through the RFID Console, provided at SensThys.com, to best suit your network environment. This document details all of the features the console has to offer.

Connecting the reader

Once you have your unit, connect it to your computer by plugging a CAT5 or CAT6 ethernet cable from your computer into a power injector, then a second ethernet cable from the injector into your reader. Next, power on the unit by plugging the injector into your power supply and launch the Console application by double-clicking the file named "RFID Console.exe" that has the SensThys logo as the icon.

After powering your SensArray unit and launching the RFID Console, the POE switch or injector commences the hand-shaking procedure with the unit, culminating in the Enterprise or Core being fully powered. Next, the CPU boots up, setting up its power architecture and becoming ready for operation.

During the power up and boot process, the primary status indicator LED will flash red. Once booted, the LED will flash green.
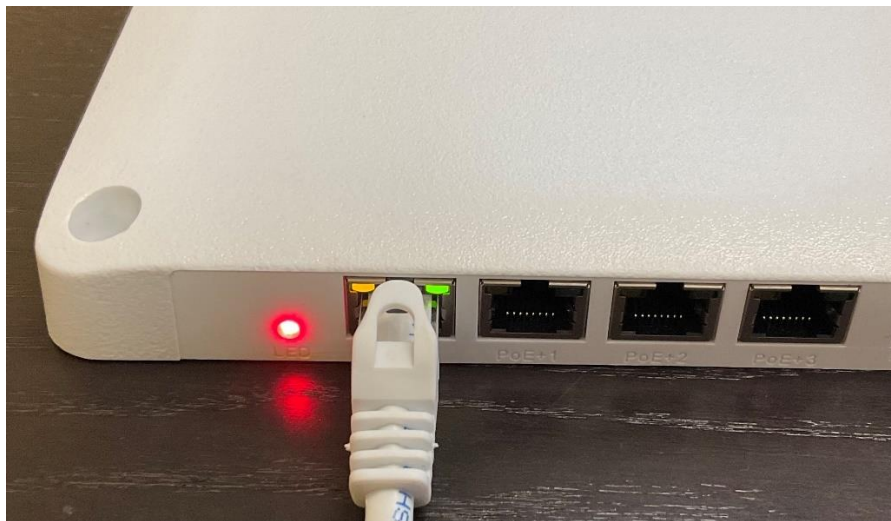
Figure 1: The Enterprise booting up
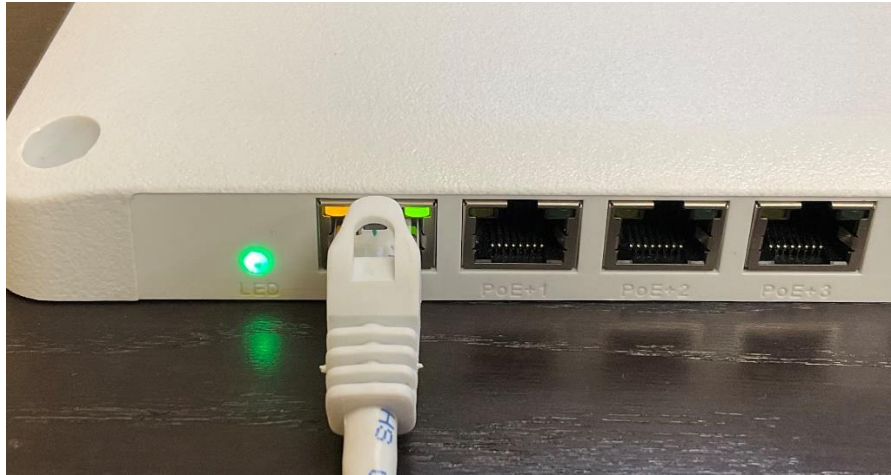
Figure 2: The Enterprise has finished booting and is ready for operation

Once the Console program is up and running, this screen shown in Figure 3 should be visible.

At this point you should connect your Enterprise or Core units to the computer. After a short period of time, less than one minute, the unit(s) will be displayed in the upper left.

Select the unit you wish to operate and control by clicking on that line. The RFID Console will then display IP address, subnet mask, etc.

The Console will display all Enterprise or Core units on the network, populating the Reader list on the left side of the Console.
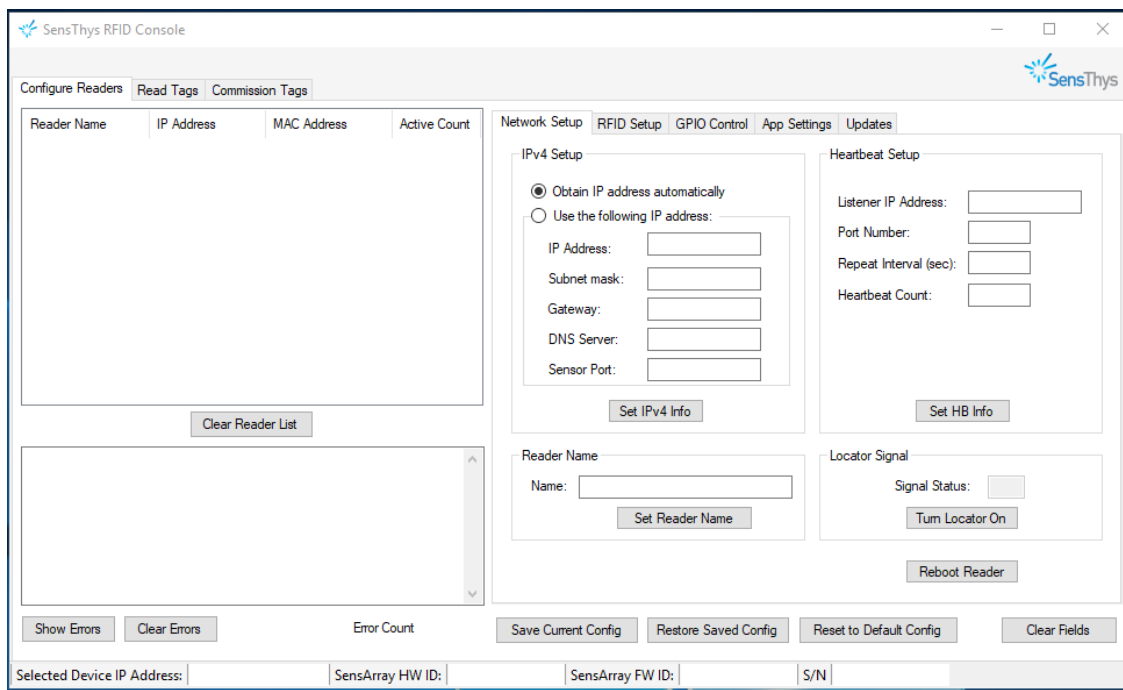
Figure 3: The main screen of the RFID Console

Figure 4: After selecting the unit, the RFID Console shows the network setup for that unit.

CONFIGURE READERS

Under the Configure Readers tab, there are 4 main sections that allow for tweaking basic settings of the reader itself. The following sections go into detail about these features.

Network Setup

The Network Setup tab has settings that allow for customization of how your reader will be detected in your network configuration. In "IPv4 Setup" you can obtain the IP Address for your reader automatically, or set the IP Address yourself by entering the IP Address, subnet mask, DNS gateway, DNS Server, and port you would like to use and clicking the "Set IPv4 Info" button. In "Reader Name", you can set a customized name for the reader so that you can make the reader more easily identifiable. Type a name into the box next to "Name:" and click the "Set Reader Name" button. In "Heartbeat Setup", you can set the target IP address and port that you want to send a heartbeat to by typing in the boxes next to "Listener IP Address" and "Port Number". You can also set the interval, in seconds, at which you want to send a heartbeat by typing in the box next to "Repeat Interval (sec)". Clicking the "Set HB Info" button will save this information.
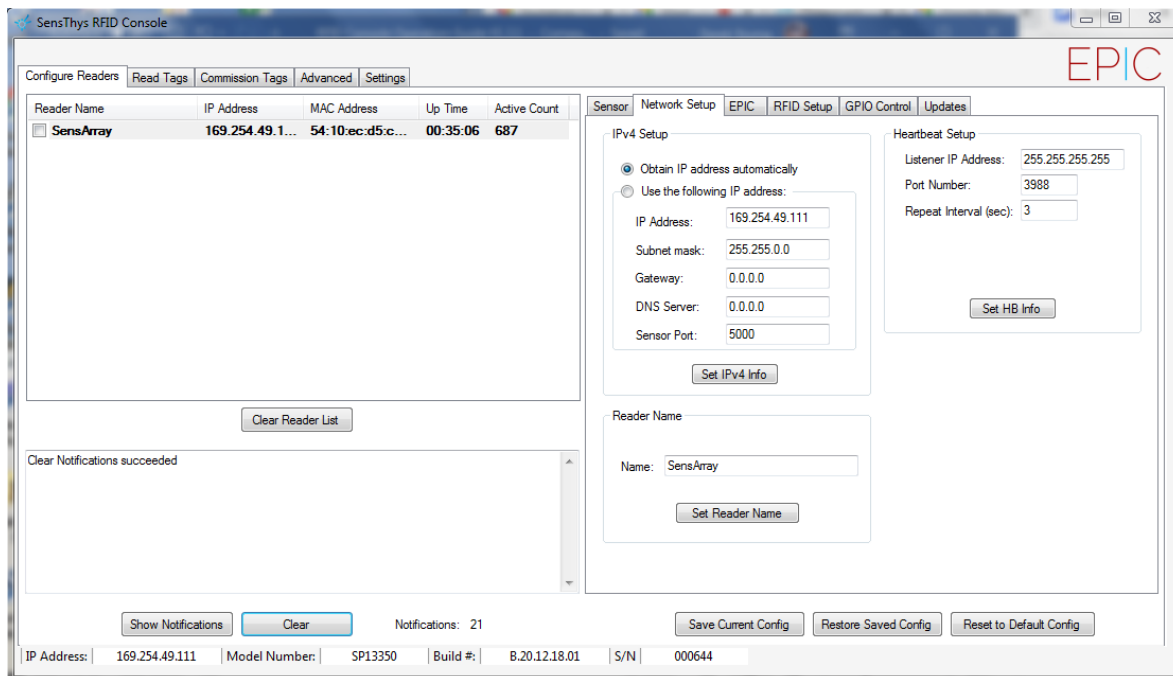
Figure 6: The Network Setup tab in the Console

EPIC

RFID Setup

The RFID Setup tab has settings that offer customization of RFID features on your reader.

Power

This tab lets you set the power, in dBm, that the antennas on your reader use by selecting a number from a drop-down menu next to the desired antenna. The default is 30.
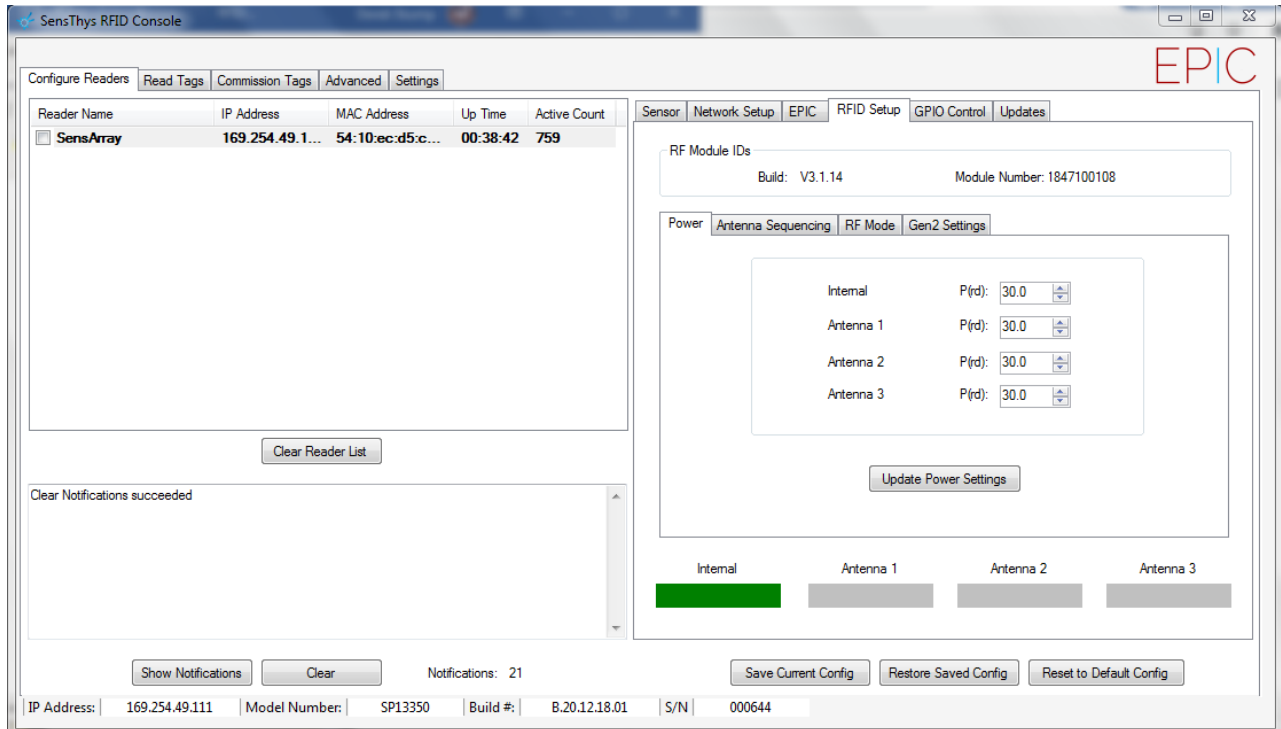
Figure 7: The Power tab in the Console

Antenna Sequencing

This tab has options that allow for changing the order in which antennas are used and which antennas are used. Antenna Dwell Time is the amount of time, in milliseconds, that an antenna spends reading tags before moving on to the next antenna in the sequence. The default dwell time is 500. # of Antennas per Seq. Cycle is the number of antennas that are used during a sequence of tag reads. Select the desired number of antennas in a drop-down menu next to "# of Antennas per Seq. Cycle", which then brings up additional drop-down menus that allow you to select the antennas you would like to use.

Below the box containing these settings are four colored boxes. These boxes indicate whether an antenna is connected or not and if it is being used. Green means the antenna is connected to that port. Grey means no antenna is connected. A box fully colored in green means the antenna is

connected and is active in the sequence. Red means no antenna is connected to the port but it is active in the sequence.
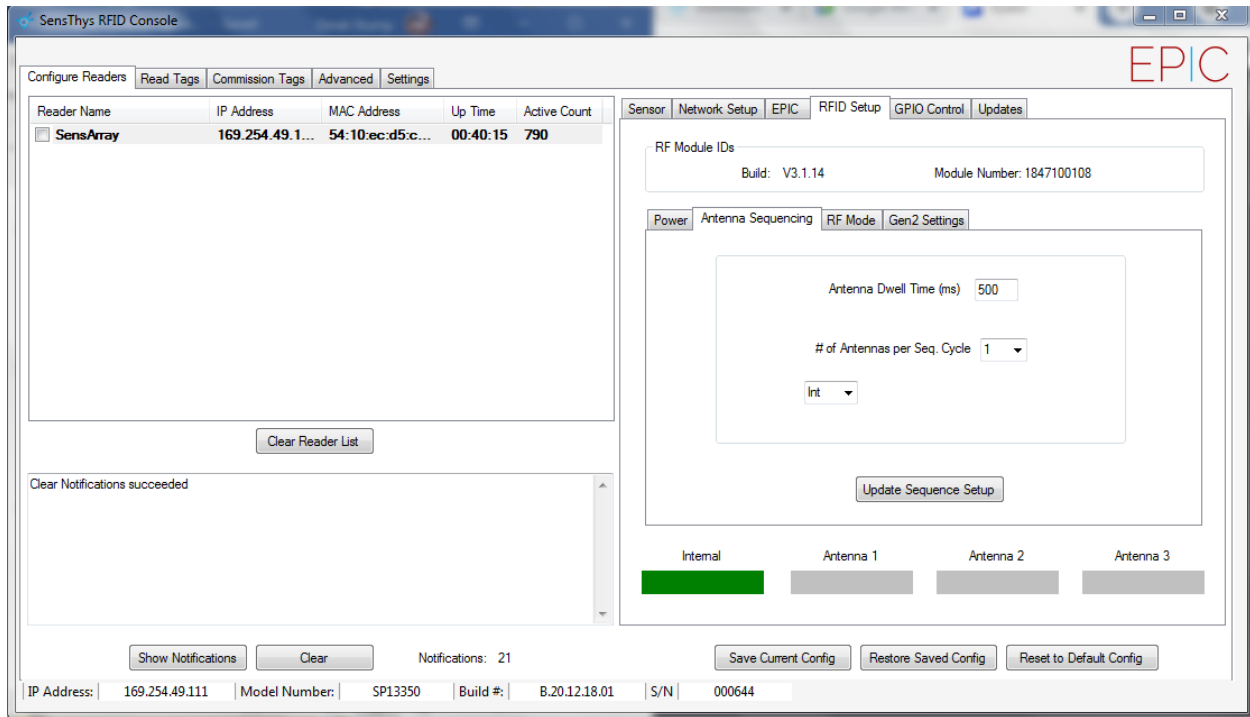
Figure 8: The Antenna Sequencing tab in the Console

RF Mode

This tab allows for configuring the style of RFID that the reader uses when reading tags. This is done by selecting an option from a drop-down menu next to "RF Mode". There are 3 options available. "Sensitive" mode has the reader read tags carefully. "Fast" mode has the reader read tags in a rapid manner. "Expresso" changes the speed of the tag reads depending on the amount of tags being read. Selecting the Expresso option opens a "Estimated Tag Population" box where you can set the expected amount of tags that are to be read.
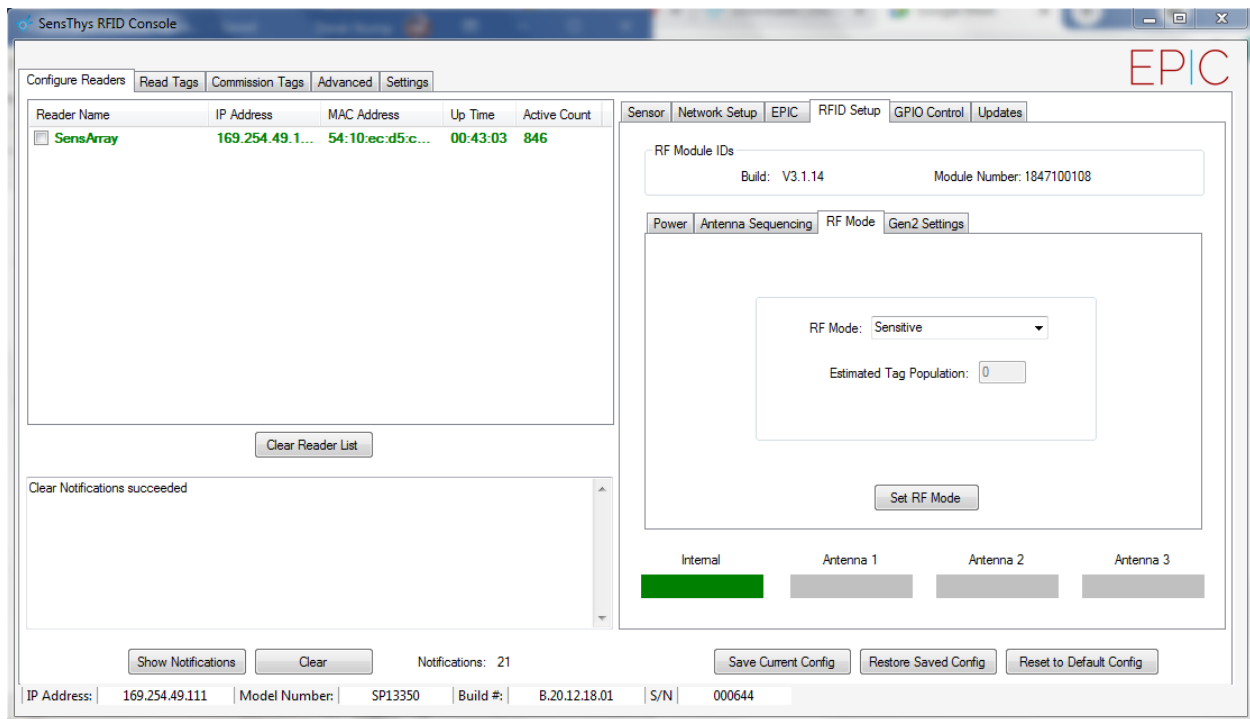
Figure 9: The RF Mode tab in the Console

Gen2 Settings

This tab has more technical settings that allow for customizing how tags are detected. In "Q" you can set the algorithm that the reader uses for detecting tags by selecting one of two options from a drop-down menu next to "Algorithm".

For general operation, we recommend Dynamic Q, minimum Q of 0, maximum of 15, and starting Q of 3.

Only advanced user should alter this setting.

 In "Select Parameters", the session during which tags are selected can be set by choosing S0, S1, S2, or S3 from a drop-down menu next to "Target". In "Query Parameters", the session during which queries are sent can be set by selecting the desired session from a drop-down menu next to "Session". Next is the "Query Target" box. Here, the drop-down menu next to this box has two options named "A" and "B". These options refer to two states tags can be in when they are being processed.
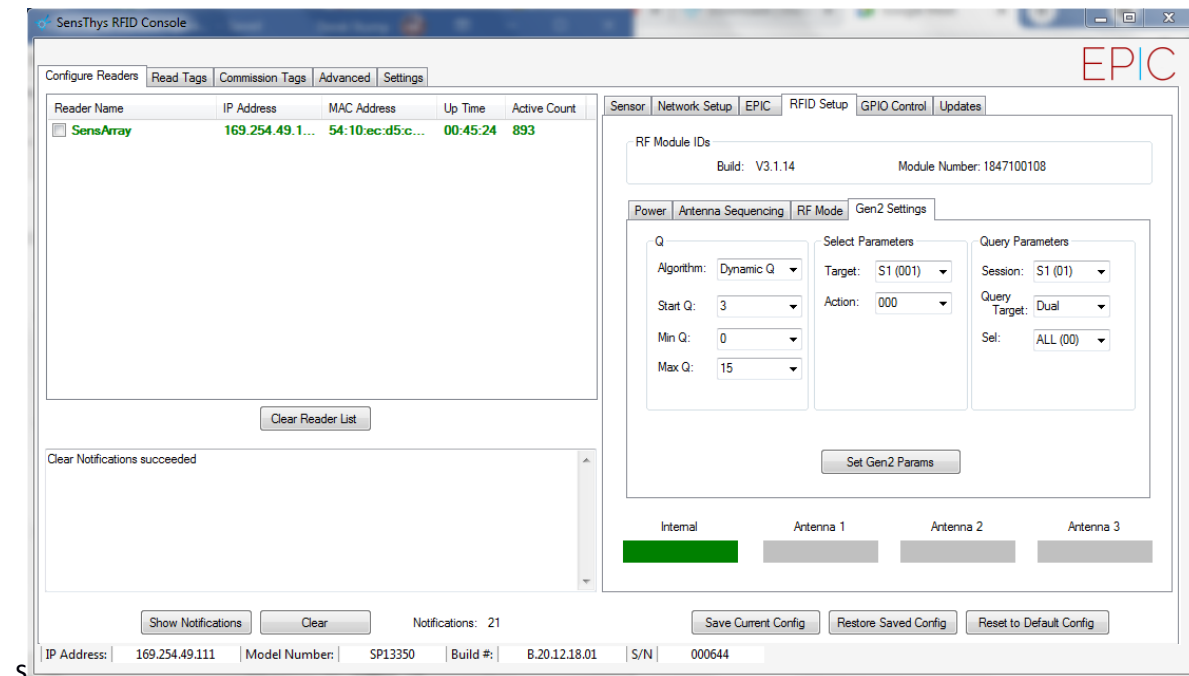
Figure 10: The Gen2 Settings tab in the Console

GPIO Control

The GPIO Control tab has settings that allow for customization of the General Purpose Inpout Output (GPIO) ports on your reader. In "24V Output", you can set the output to activate upon starting up the console by checking the "Activate on Startup" box or set it to be active only when you want it to by clicking the "24V Active" box. In "GP Inputs" and "GP Outputs", you can set which input and output ports you would like to use by checking the boxes for the ports you want to use. For more detailed information on how to use GPIO, read the GPIO Deployment Guide at the following link:

GPIO Deployment Guide
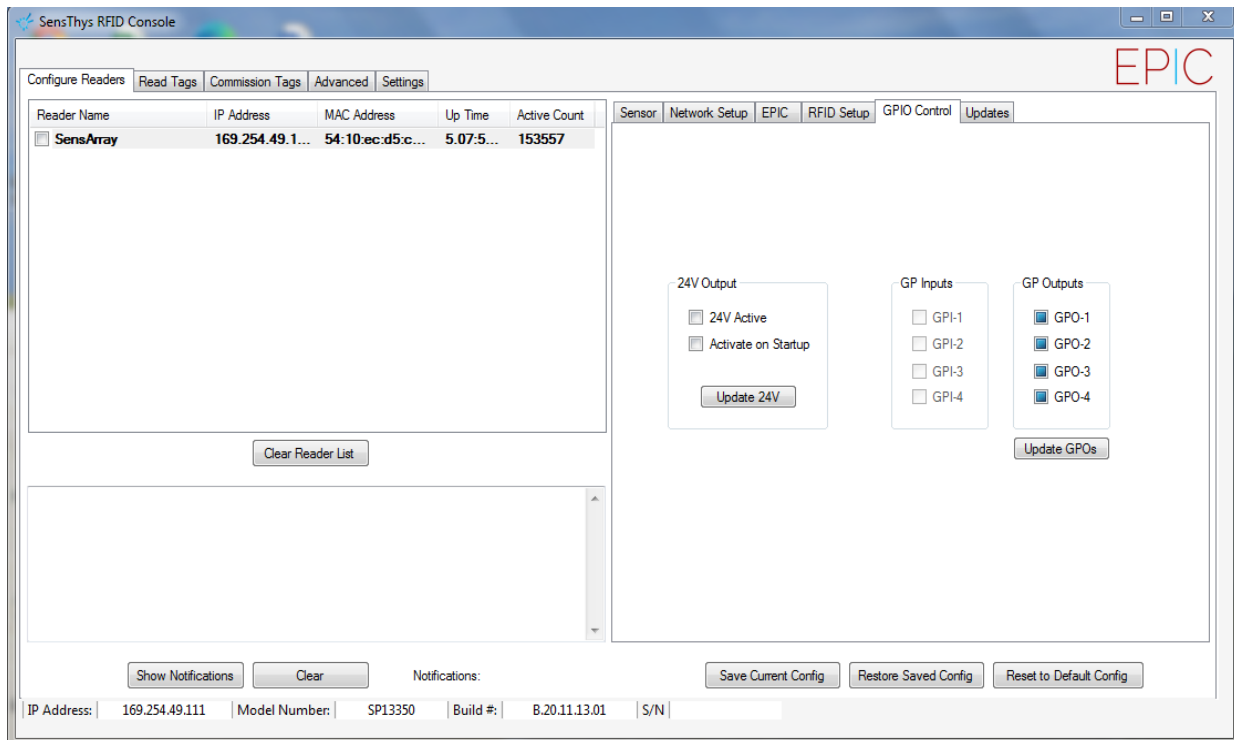
Figure 11: The GPIO Control tab in the Console

Updates

The Update tab lets you update the firmware of the console if an update is needed. Click the "Browse" button, find the update file, provided by SensThys, and click the "Update" button.
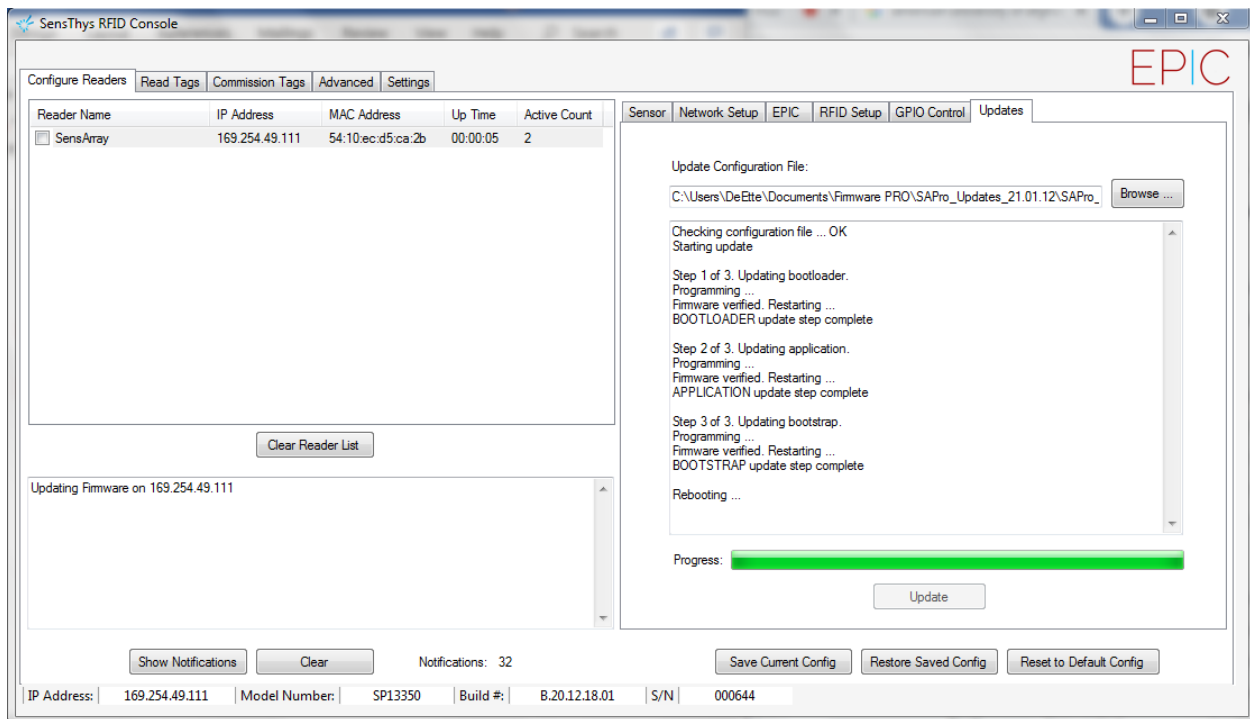
Figure 12: The Updates tab in the Console. Shown is sample run of a typical update.

READ TAGS

The Read Tags tab is where the magic occurs within the console. It is here that you can read tags by using the readers in your network. Place an RFID tag, or tags, in front of the unit, and click the "Read" button. Once the desired amount of tag reads have been performed, press the "Stop" button to stop tags from being read. A list will then appear showing the antenna and reader the tag was read on under "Rdr #" and "Ant #" respectively, the EPC of the tag under "EPC", the RSSI (Return Signal Strength Indicator) of the tag under "RSSI", and the number of times the tag has been read under "Count". Clicking the "Clear Tag List" button will erase the read tags from the list.
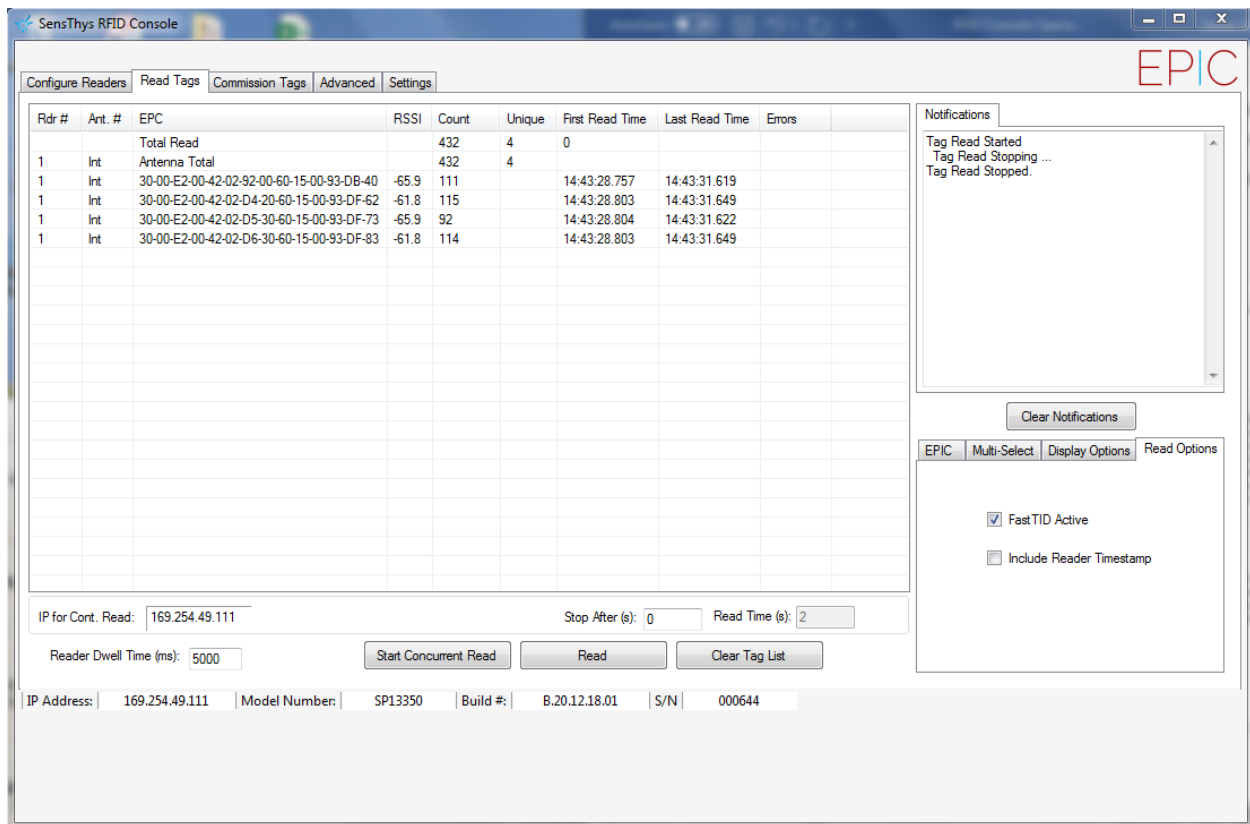
Figure 13: Sample run of tag reads after pressing the "Read" button

Concurrent Read

Next to the Read Tags button is the Concurrent Read button. There are two ways tags can be read in the console. The method described previously is a sequential read, where tags are read one reader at a time before moving to the next reader in the network after a set amount of time. Concurrent Read allows for reading tags on all of the readers in the network at once. If such a method is desired, click the Concurrent Read button.

In the bottom right corner of the Read Tags tab are 4 settings that allow for customizing how tags are read.

EPIC

EPIC is a form of error correction pioneered by SensThys in order to prevent data loss from tags that can occur due to interference from other devices or data being lost over transmission. The way this is done is by encoding the data for error correction and then encrypting the desired tags with a key that is given to the user, which is then input into the console in the space next to the Browse Button, loading the key by pressing the "Load Customer Key" button, then using the key by checking the "Decode on Console" box
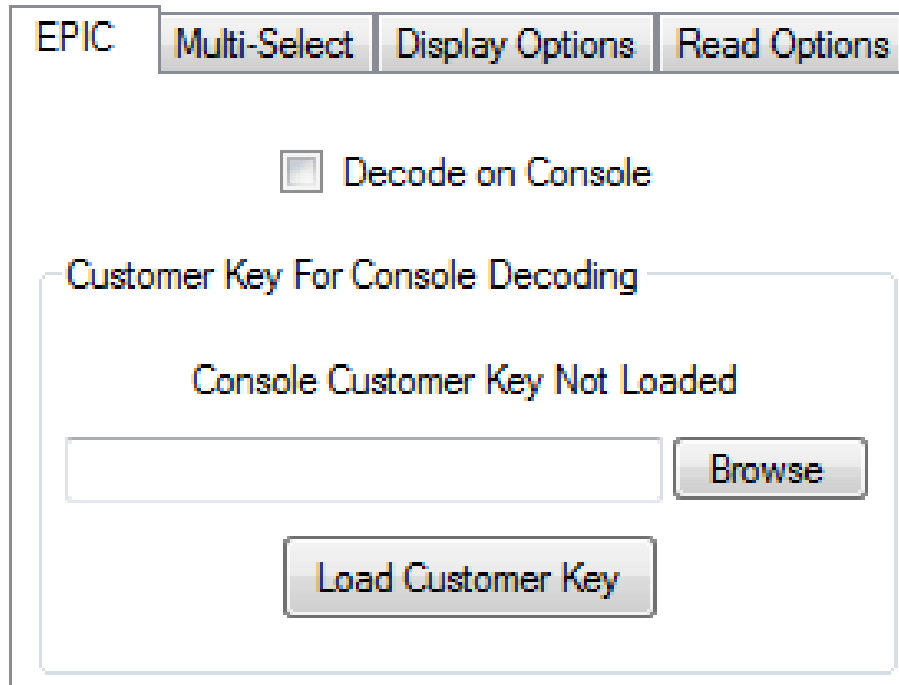
Figure 14: The EPIC tab in the Console

Multi-Select

This tab has settings that allow for customization of the sequence at which tags are read. At the bottom, there 3 options to choose from. Std. Mode, which is the default, has tags selected (displayed on the list on the left of the screen) and read at the same time. Sel b4 Rd has tags selected before its contents are read. Rd b4 Sel has the contents of a tag read before it is selected. If "Rd b4 Sel" or "Sel b4 Rd" is selected, three additional options are available. "Number of Selects" is the number of times a tag is selected before a new cycle, or set of tag reads, is started. "Number of Cycles to Execute", is the number of cycles the reader will execute before moving on to the next antenna that is enabled. All of these options can be customized by entering a number into a drop-down menu next to each of these three options.

Figure 15: The Multi-Select tab in the Console

Display Options

This tab has settings that allow for toggling what information is shown on the list when tags are read. Checking the "Auto-Clear Tag List" box will automatically clear the tags in the list after all of the tag reads on a network are completed. Checking the "Detailed View" box updates the amount of reads for each tag as they are being read. Checking the "Display XPC1" box shows the XPC1 number, in the form of the two two-digit numbers separated by a dash, for each tag. Checking the "Display PC w/ EPC Data" box shows the PC number, in the form of two two-digit hexadecimal numbers separated by a dash, in front of the EPC number associated with the tag.

Figure 16: The Display Options tab in the Console

Read Options

This tab has additional settings regarding tag reads. Checking the "FastTID Active" box enables a functionality for certain Impinj die that allows the TID and EPC to be read at the same time. Checking the "Include Reader Timestamp" box provides a timestamp from the reader for each tag read.
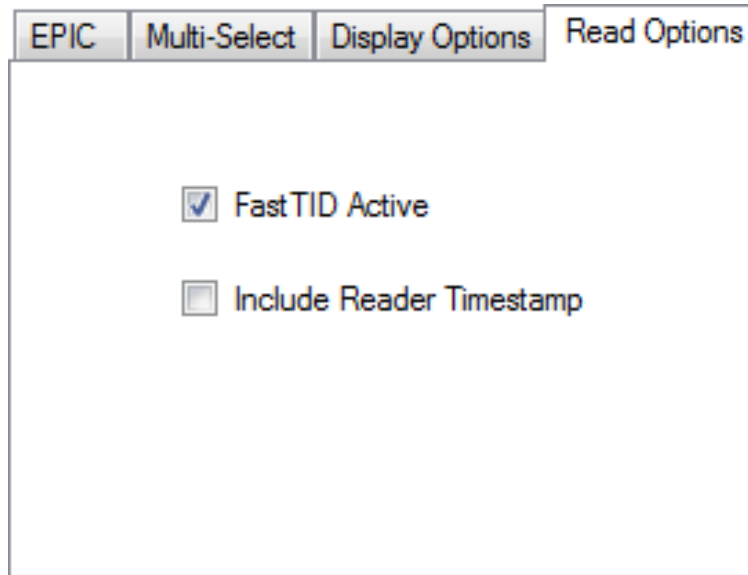
Figure 17: The Read Options tab in the Console

COMMISSION TAGS

Next to the Read Tags tab is the Commission Tags tab. The settings provided on this tab allow for keeping track of tags and creating new tags.

Figure 18:The Commission Tags tab in the Console

Commissioning Station Setup

In this section, you can set the power level, in dBm, for reading and writing tags. You can also choose from a drop-down menu whether you would like to use the reader's internal antenna or one of several external antennas to pick up tags.

Inventory

The inventory is a list of tags that were picked up by the antenna you have selected in Commissioning Station Setup. To get this list, select the desired antenna and press the "Inventory Tags" button
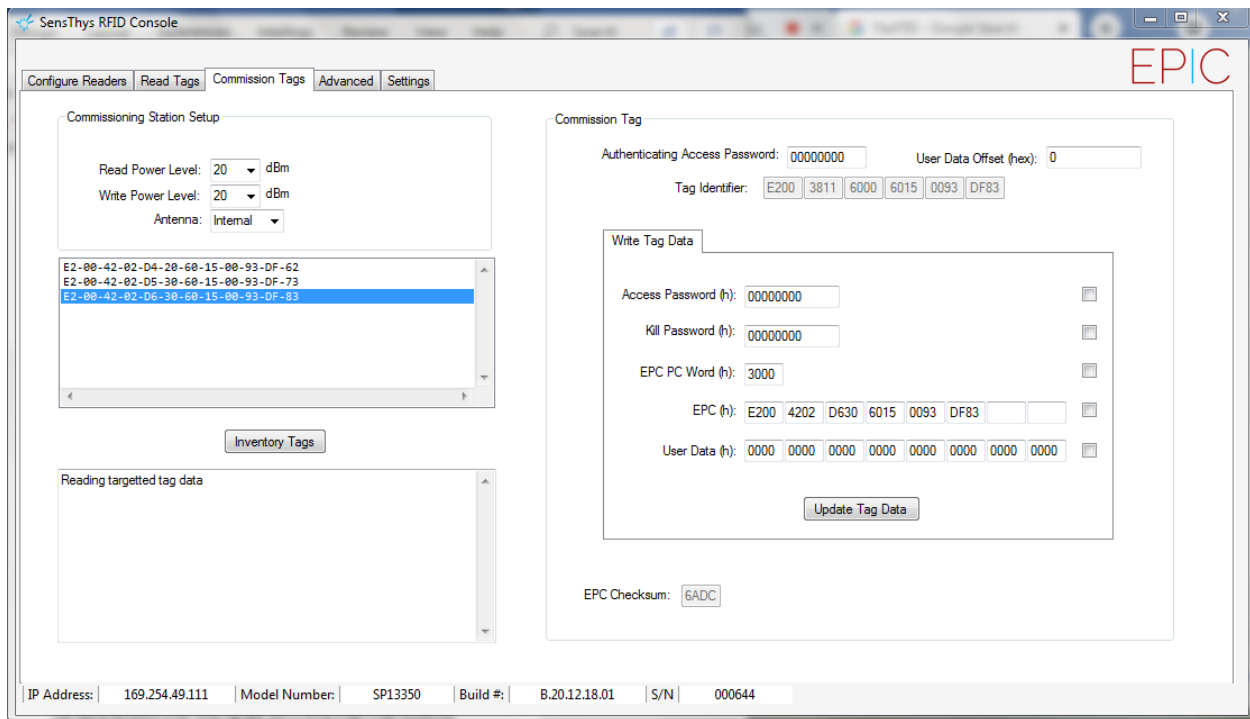
Commission Tag

This section shows you the identification number, in hexadecimal, that the tag uses to identify itself, and has several settings in the "Write Tag Data" box that allows you to add extra security measures to and modify the tag if the situation calls for it. You can set an access password that will then be required to be entered if that tag needs to be accessed, and a kill password that will make the tag be unreadable if entered in case of a situation where you would want the tag to no longer be readable and discarded. Both the kill and access passwords are all 0s by default. User Data at the bottom of the "Write Tag Data" box is a string of eight 4-digit hexadecimal words that the reader uses to pick up the tag the User Data is associated with. Changing this value will create a new tag that uses the new User Data you have created as its User Data. At the bottom is an EPC Checksum, a 4-digit hexadecimal number that the tag uses to check for errors on the receiving end.

ADVANCED

The Advanced tab includes more technical settings that allow for fine-tuning your reader for use in special environments such as environments with high temperatures or a high amount of noise.

Features

First is the Features tab.

The "Current Reader Date & Time" section lets you set the date and time on the reader to the current date and time by pressing the "Set Reader Date/Time" button. The date and time is random by default.

In "Reader Configuration", pressing the "Get Reader Config" button will give you the number of antennas, number of ethernet ports, and number of general purpose inputs and outputs of your reader. It will also point out if your unit allows for DC input or not.

In "Inventory Filter", you can set a mask, in sets of 4 hexadecimal digits, so that the reader only picks up tags that include the hexadecimal digits from the mask. The "Mask Start Bit Address" box lets you choose the starting point in your mask where the hexadecimal digits within the mask are used for comparison against tags received by your reader, and the "Mask Length (# of bits)" box lets you choose the length, in bits, of the mask that you want to use for filtering.

Lastly, the "EPIC Mode Setting" box lets you choose the style of error detection that you want to use by choosing the style you want from a drop-down menu and clicking the "Set EPIC Mode" button. The default value for this option is "Pass/Send (Std Mode)".
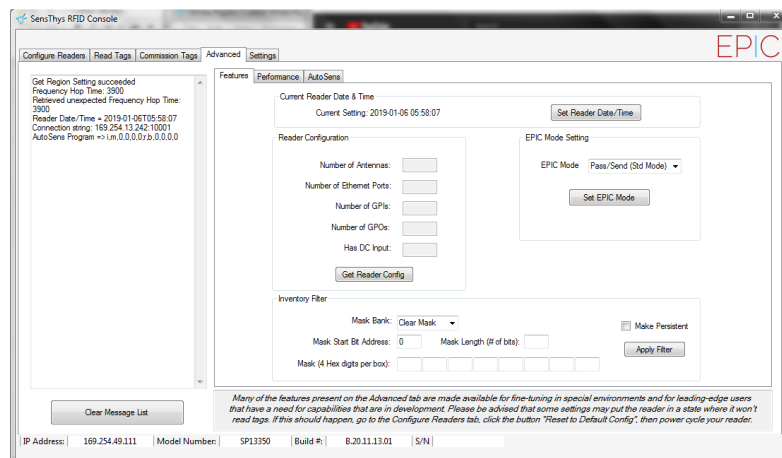

Figure 19: The Features tab in the Console

Performance

Next is the Performance tab.

In "DRM", Dense Reader Mode can be toggled on or off by pressing the button below the text showing if DRM is on or not. Dense Reader Mode is a setting that minimizes interference from other readers in your network while tags are being read. If DRM is off, the reader is more

sensitive to tags at the expense of being more susceptible to noise in the environment that can affect tag reads. if DRM is on, the reader is less sensitive to noise in the environment at the expense of being less sensitive to tags. DRM is set to On by default.

Frequency Hop Time is the interval, in milliseconds, at which the console waits before switching frequencies. The desired hop time can be selected by a drop-down menu next to "Frequency Hop Time", starting at 50 and going in increments of doubles up to a maximum of 400. The hop time is 400 by default.
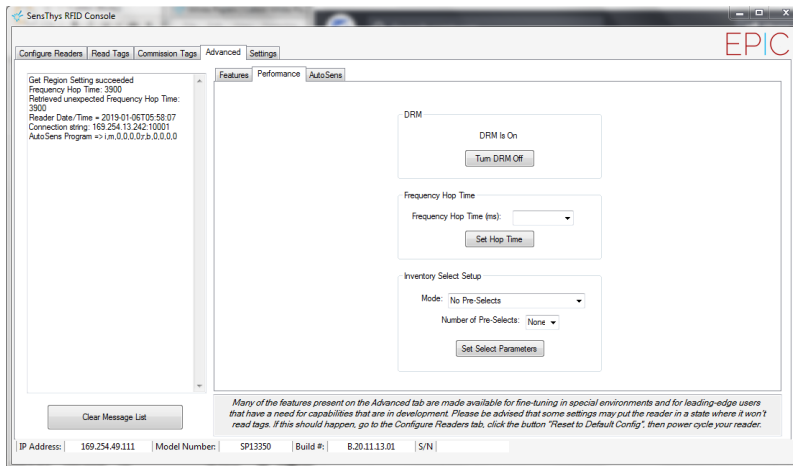

Figure 20: The Performance tab in the Console

AutoSens

Lastly is the AutoSens tab. AutoSens is a scripting language that is used to create programs that allow readers to run automatically without input from the user, and this tab lets you adjust settings related to AutoSens.

In "Data Delivery Connection", you can set the IP address and port where you connect the reader to process data by entering the IP address you want into the "IP Address" box, entering the port you want into the "Port #" box, and pressing the "Set Connection Info" button. The default values are "169.254.13.242" for the IP address and "10001" for the port number.

In "Macro Program", you can create a set of instructions that dictates how the reader acts when AutoSens is running. By default, the program contains the lines " i,m,0,0,0,0;" and "r,b,0,0,0,0;". It should be noted that programs input into this box need to have commas between the letters and numbers for the reader to function properly. If a reader has been programmed with an AutoSens program different than what is shown in the Macro Program box, tags will not be seen by the console.

In "AutoSens Control", pressing the "Start AutoSens" button will initiate AutoSens, while pressing the "Stop/Pause AutoSens" button will pause or stop AutoSens. There is a drop-down selection under "AutoSens Pause Interval (min.)", which lets you select the interval, in minutes, between pauses of AutoSens.
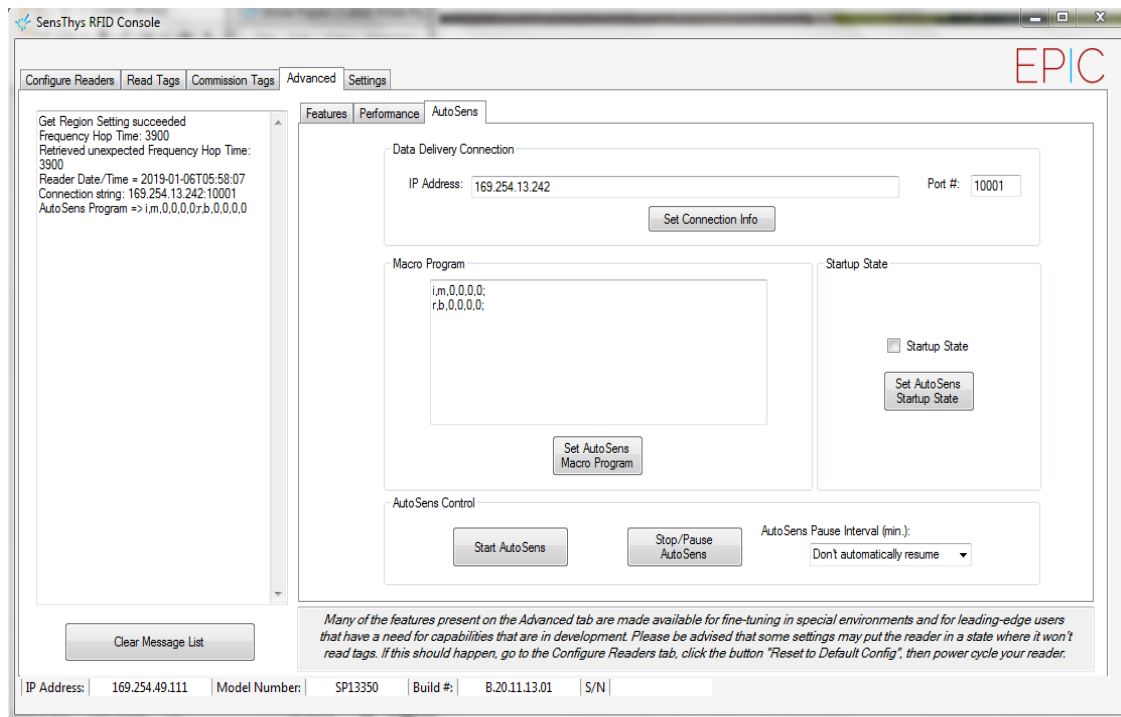
Figure 21: The AutoSens tab in the Console

SETTINGS

The Settings tab lets you choose where data is saved after tags are read. You can choose to not record any reads by checking the "Recording Off" bullet, record only the first round of tag reads by selecting the "Record First Reads Only" bullet, or record all the tag reads obtained by selecting the "Record All Tag Reads" bullet. The file is saved in the ".csv" format.

Checking the "Clear Readers Not Sending Heartbeat" button clears readers from the recording file that are not sending a heartbeat to the console.

Clicking the "Save Console Settings" button saves the previously mentioned settings.
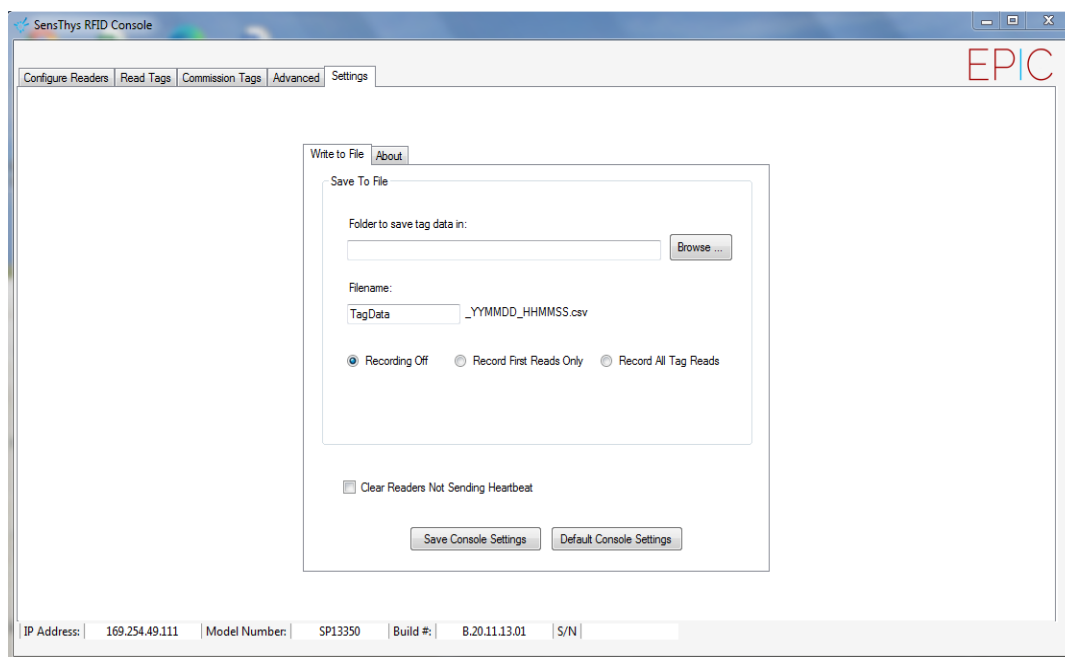
Figure 22: The Settings tab in the Console