



ANTware II User's Guide

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Revision History

Revision	Effective Date	Description
1.0	October, 2009	Initial release
1.1	May, 2011	Added Tools section
1.2	September, 2013	Add RSSI Statistics and ARCT Support Add Advanced Features: Advanced Burst, Encryption, Event Filter, Event Buffer, User NVM, Selective Data Update and High Duty Search

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1 Introduction

ANTware II is an application used for the control of ANT wireless devices. It is an excellent tool for first time ANT developers to explore the capabilities of ANT, and for experienced users to easily setup and monitor advanced ANT networks.

2 Getting Started

Figure 2-1 shows the application window that appears on opening ANTware II. On the left side of the application are the device panels, and the remaining portion of the window is the channel pane.

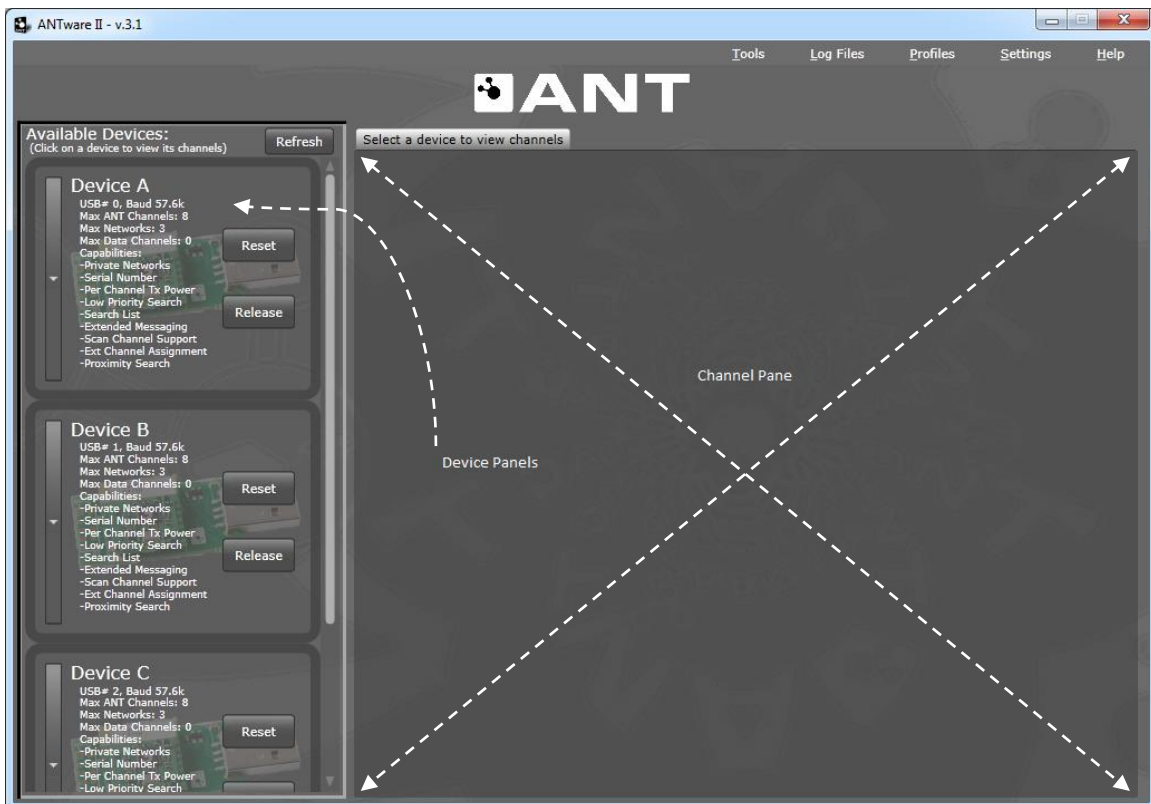


Figure 2-1. ANTware II Application Window

2.1 Device Panel

The device panels show all devices that are connected to the PC, and **not in use in other applications** (Figure 2-2). Each panel shows the capabilities of the respective ANT device and provides access to the functions applicable to the entire device. The device panels are also used to select which device's channels are displayed in the channel pane.

Figure 2-2 shows the device panel after the expander button has been pressed, allowing access to all the device-level functions such as setting the network key, transmit power, etc. as described in section 6.2. This expanded device view also shows the device level feedback display.

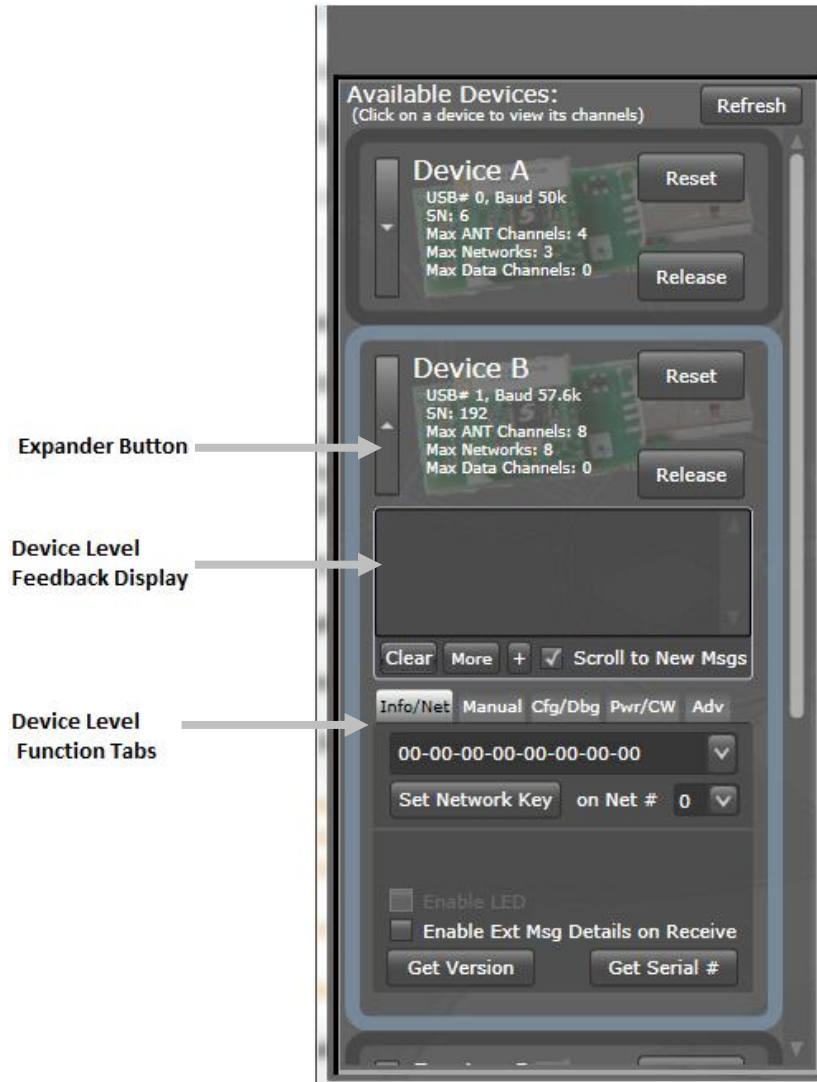


Figure 2-2. Detected ANT Devices

The Device Popout is shown in Figure 2-3. It may be opened by clicking either the 'Show Advanced Device Panel' button under the Adv tab or the '+' button on the Feedback display (see Figure 2-4). It allows access to the advanced device-level commands available on that particular device. There is a Device Popout for each device and they may be arranged as desired.

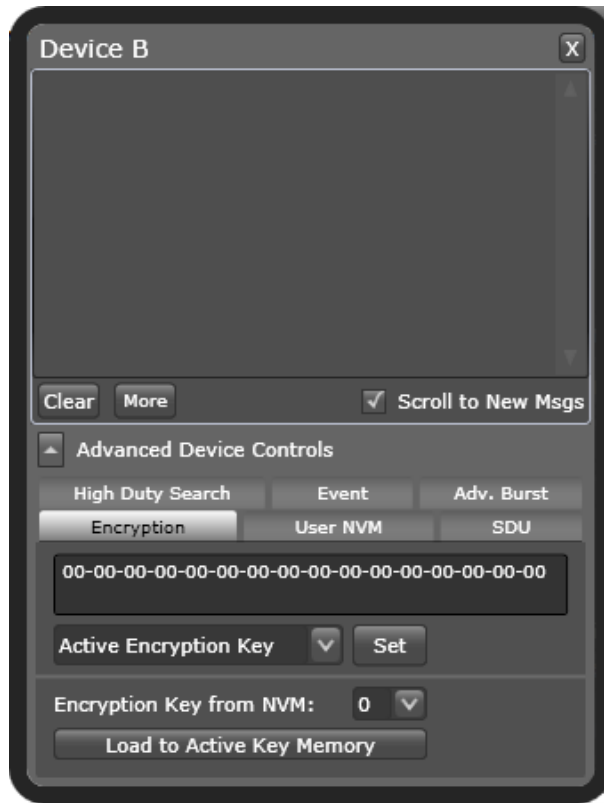


Figure 2-3. Device Popout

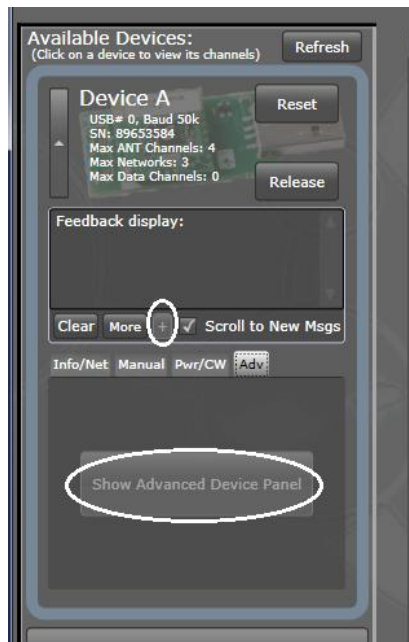


Figure 2-4. Displaying the Device Popout

2.2 Channel Pane

The channel pane displays all channels of a selected device. To select a device, simply click anywhere on the desired device panel (except for the Reset and Release buttons). Once a device is selected, its device panel will have a highlighted outline and all of its channels will appear as tabs in the channel pane (Figure 2-5). Each channel can be managed under its respective channel tab. Each tab contains all of the functions to manipulate the channel's configuration parameters. All channel functions are explained in detail in the ANT Message Protocol and Usage document.

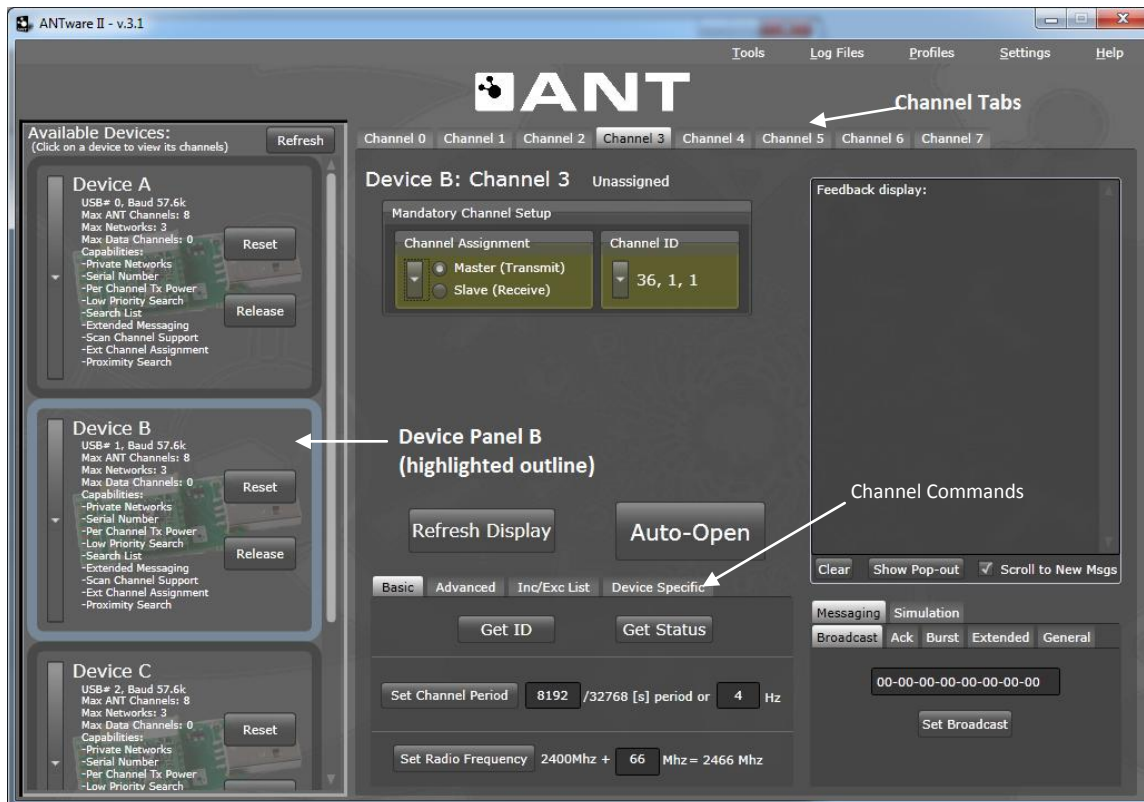


Figure 2-5. Viewing Channels on a Device

There are several areas under each channel tab (Figure 2-6): The Channel Assignment and Channel ID expandable boxes allow control over the 'Mandatory Channel Setup' parameters that require user input prior to opening a channel. Using Channel Commands tabs (Basic, Advanced, etc) you can control more advanced channel configuration parameters as described in the following sections. To find where particular ANT commands are located within ANTware II, refer to section 6. Only the tabs supported by the selected device will be displayed.



Figure 2-6. Channel Tab Features

The upper right hand side contains the feedback display and the lower right contains a set of tabs to control channel messaging. The button 'Show Pop-Out' will open the feedback display and message control in a separate pop-out window. This allows the user to view and manage activity on several channels at once.

An important feature is the prominent 'Auto-Open' button. The Auto-Open button makes channel configuration easier by automatically applying all parameter changes with a single button press. As each parameter is set, their respective fields will be highlighted with a yellow tint; when the Auto-Open button is pressed ANTware II will apply all highlighted configuration parameters and then open the channel. Please note that only highlighted parameters will be configured when Auto-Open is used; parameters that are manually configured (i.e., by pressing the corresponding button next to the parameter) will not be configured again when pressing Auto-Open.

3 Creating a Simple Network

The simplest network to create is a single independent master-slave channel between two ANT devices. In ANTware II, with the new Auto-Open button, and multiple device support, this can be achieved in just a few clicks within the same instance of the application. First, ensure you understand the two mandatory configuration parameters of an ANT channel as described below. For more detailed explanations refer to the ANT Messaging Protocol and Usage document.

Channel Assignment

In an ANT network, a channel consists of a master device which transmits a broadcast message at a set channel period; and a slave device, which finds and synchronizes to the master's periodic broadcast. The 'Master' and 'Slave' channel assignments and the periodic broadcast are simply used for synchronization purposes, and do not limit the capabilities of a given node in a network; both master and slave nodes support bi-directional communication.

Channel ID

Each channel must have a set channel ID. The channel ID is a key ANT mechanism that enables multiple channels and networks to exist in the same environment. The channel ID is used to uniquely identify a channel in a given network. The channel ID is set by the master node, and is used by the slave to specify which master to communicate with. Slave nodes can search for a specific master, or for a type of master by setting one or more of the channel ID parameters to the wildcard value '0'. Once a matching master is found, its channel ID automatically replaces the wildcard value(s).

To configure the single channel network described above, first ensure that **two** ANT USB devices are connected to the PC. On opening ANTware II, the two devices should be displayed in the ANTware II device list.

3.1 Configure the Master Device

Click on the appropriate device panel to select the ANT device that will act as the channel master. In the channel tab (e.g. Channel 0) go to the Mandatory Channel Setup and select the 'Master (Transmit)' option in the 'Channel Assignment' box (Figure 3-1). Set the 'Channel ID' as desired; in this example 33, 1, 1.



Figure 3-1. Channel 0 Configuration of Master Device

Click on 'Auto-Open', and ANTware II will send the configuration commands and open the master channel. Once the channel is opened, the master device will start transmitting broadcast messages at the default channel period. The channel tab's feedback display will show the:

Commands performed: 'Assigning Channel...', 'Setting Channel ID...', 'Opening Channel...'

Resultant RF events: EVENT_TX, message code 0x03

Data sent: 00-00-00-00-00-00-00-00 (defaults to increment every message)

Serial message decoded: 40, 00-01-03 (Channel Response Event, Channel #-Msg ID-Msg code)

To continue to see this feedback display while configuring other channels, click on the 'Show Pop-Out' button. This will open another window containing just that channel's feedback display. Use the expander button shown in Figure 3-2 to display the Feedback Display if it is not already visible.

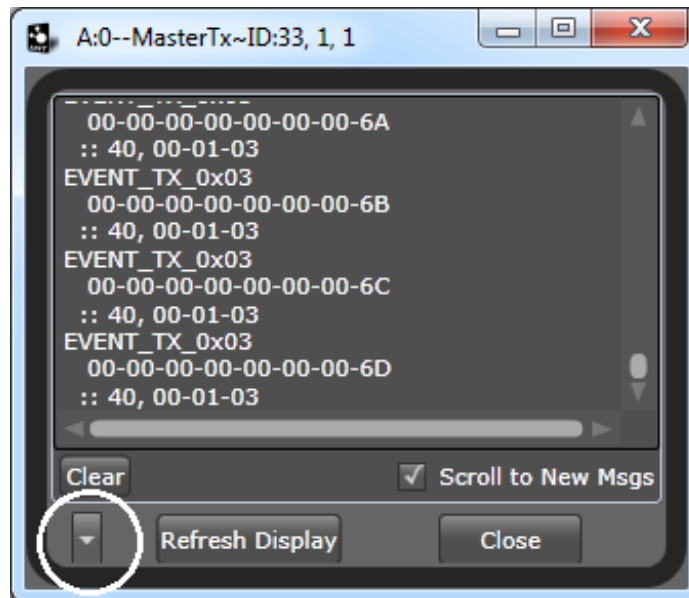


Figure 3-2. Displaying the Pop-Out Window's Channel Feedback Display

3.2 Configure the Slave Device

Select the device panel of the ANT device that will act as the slave. Under the channel tab, go to 'Channel Assignment' and select the 'Slave (Receive)' option. Set the Channel ID to match that of the master (e.g. 33, 1, 1). Press Auto-Open, and the slave will begin searching for the matching master.

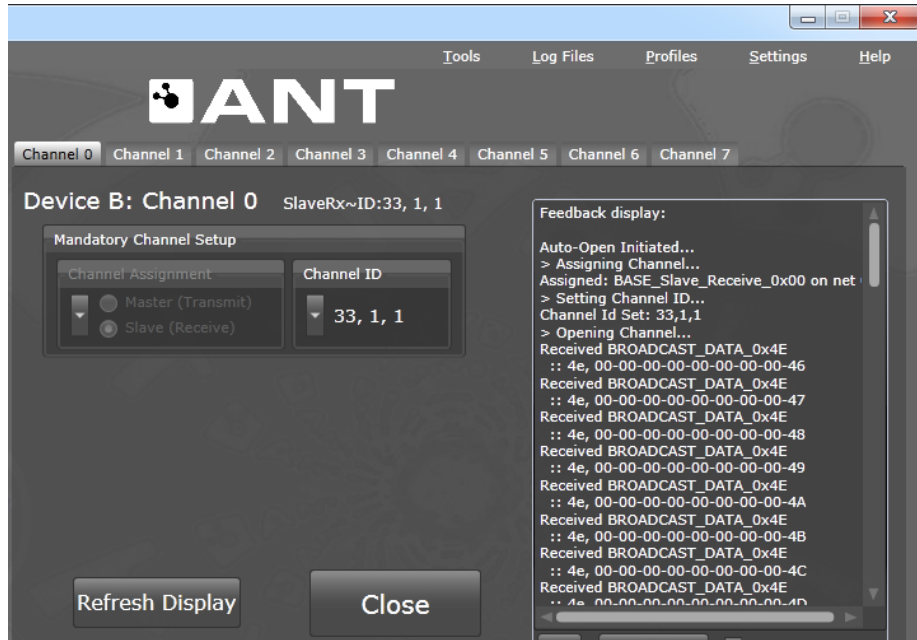


Figure 3-3. Slave Channel Configuration

The channel tab's feedback display will show the configuration commands, and reception of data once the master has been found. The slave will synchronize with the master. Now that the simple network is established, it is possible to experiment with the many other ANTware II features.

4 Advanced Features

ANTware II features are navigated using the 'Settings', 'Profiles', 'Tools' and 'Help' menus described in this section. Each menu can be opened using the controls at the top right of the ANTware II window.

4.1 Settings

The settings menu gives access to 'Options' to control the user interface and program settings, and 'Filters' to control which messages appear in the feedback display.

4.1.1 Options

ANTware II has an options window (Figure 4-1) that can be used to customize the display appearance, and start-up and shutdown behaviours using several settings. Go to Settings->Options to access the options window (Figure 4-2).

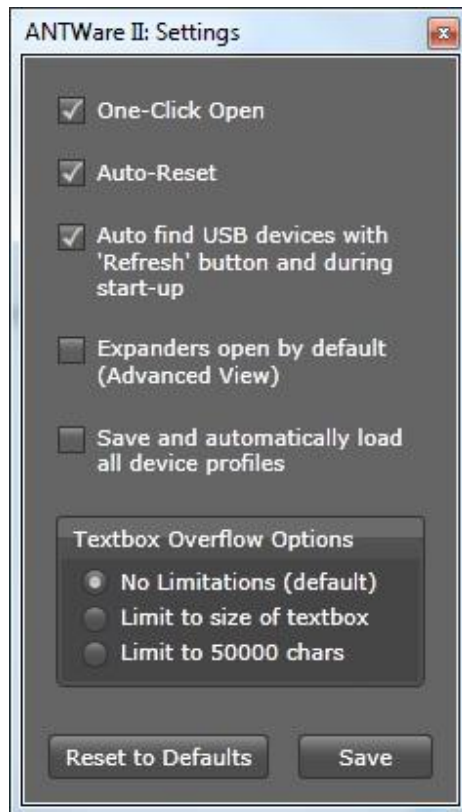


Figure 4-1. Settings->Options Window

4.1.1.1 One-Click Open

This enables the 'Auto-Open' button. Disabling this feature means the Open button will send the open command only and any changed parameters must be individually applied by the user.

4.1.1.2 Auto-Reset

Controls whether devices are automatically reset when they are released or connected to (via a refresh). Disabling this option means devices will continue to operate in their current state when ANTware II is closed (or the device 'released'). In addition, the current state of ANT will be unknown on ANTware II's start-up.

4.1.1.3 Auto Find USB Devices

When this option is selected, ANTware II will automatically load all available ANT USB devices. Disabling this feature means that devices will not be loaded until the user presses the refresh or add device buttons.

4.1.1.4 Expanders Open by Default

Opens all expanders to show additional controls by default.

4.1.1.5 Save and Automatically Load All Device Profiles

Saves the current multi-device profile on exit and attempts to reload the profile on the subsequent ANTware II start-up. This allows the channel configurations for all connected devices to be maintained between sessions. Refer to section 4.2 for information on using device profiles.

4.1.1.6 Textbox Overflow Options

Limit to size of textbox - Feedback display will only keep messages within the limits of the textbox. As new messages are received, the old text will scroll out of the limits of the text box and be deleted. This feature optimizes the application's memory usage during extended testing. This does not affect the log files in any way.

Limit to 50000 chars – Feedback display will only display 50000 characters. Each time this limit has been reached, the 10000 oldest characters will be removed.

4.1.2 Filters

ANTware II allows the channel feedback display to be filtered, controlling which messages are shown. Go to Settings->Filters to access the filters window (Figure 4-2). To filter a channel's feedback display, the 'Enable Filters' checkbox must be checked.

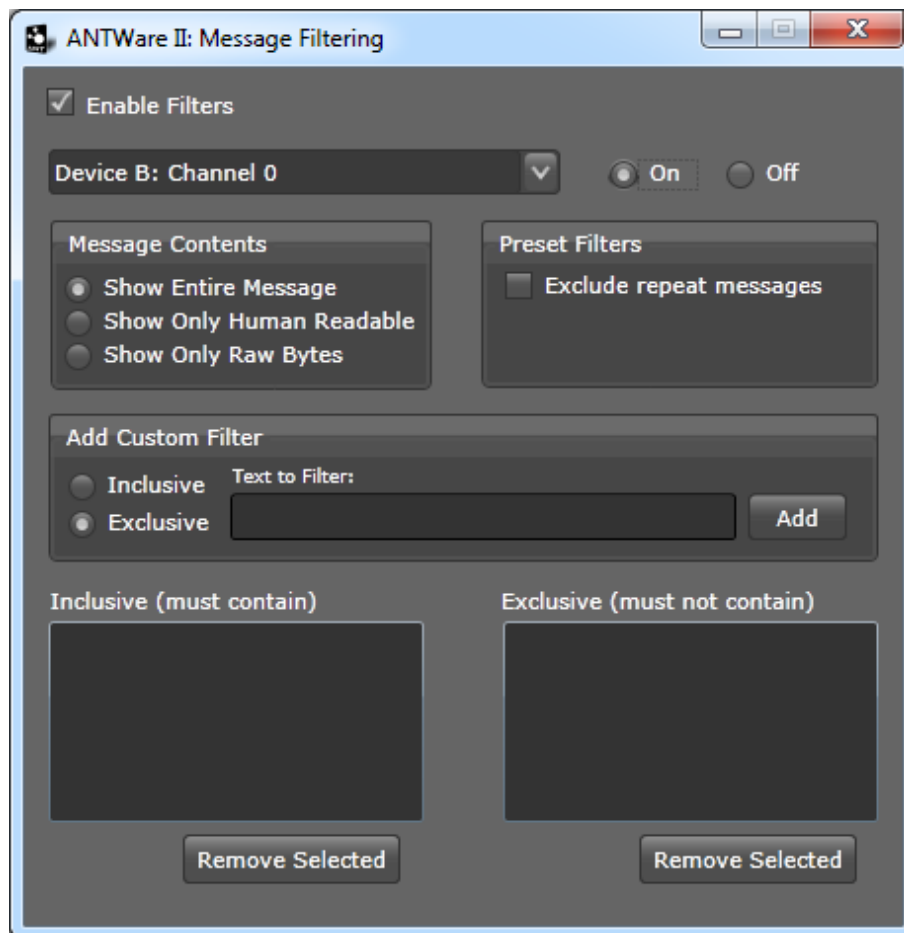


Figure 4-2. Settings->Filters Window

Filters are applied to a device on a channel by channel basis. To change the filters for a given channel, select that device and channel from the drop down box, and select the 'On' radio button.

Once the filter is turned on, the filter settings can be changed. The messages can be limited to show only the human readable portion or only the raw bytes (i.e. hexadecimal) portion. The 'Exclude repeat messages' option can also be enabled to display only the first message of any given set of repeated messages.

Custom inclusive or exclusive filters can be manually added using the 'Add Custom Filters' controls. When creating a custom filter the filtering is based on a string comparison of the contents of every string printed to the feedback display.

4.2 Profiles

Profiles are a way to make channel configuration simpler and faster. In ANTware II a profile is an xml file containing ANT configuration parameters that can be loaded into the user interface. They allow for quick and consistent setups, in addition to enabling configurations to be easily shared with others. Profiles can be saved or loaded at three different levels. A channel profile contains the setup parameters of a single channel. A device profile contains several channel profiles along with the ability to set network keys (Note: To save network keys in a profile the value must be manually edited in the file). A multi-device profile contains several device profiles. Note: Profiles contain only a subset of all the settings accessible in the ANTware II interface; the profile xml can be opened in any text editor for viewing of saved parameters.

Do not confuse these ANTware II profiles with ANT+ Device Profiles.

4.3 Log Files

ANTware II automatically generates log files capturing all ANT messaging. Use the 'Log Files>Open Log File Directory' menu to open a Windows Explorer showing the save location of the log files. The log files are text files and are named after the USB Index of the ANT device they were collected from. This index is not persistent and is managed by windows. It is influenced by such factors as what other USB devices are present and the sequence they were plugged in. Note the log files are always appended to and may become large over time. To simplify analysis it is useful to erase or rename the existing file before logging data of interest.

The device file format is shown in Figure 4-3. The format is simple and consists of 4 quantities:

- ANTware Session Time – Time in seconds since ANTware II was started
- System Uptime – Windows uptime in milliseconds
- Serial Direction – Whether the message was transmitted or received from the ANT host
- Message Buffer – Contents of the ANT serial buffer. Refer to D652 ANT Message Protocol and Usage for details

Care should be taken in using the timestamps as they originate from Windows rather than the real time system.

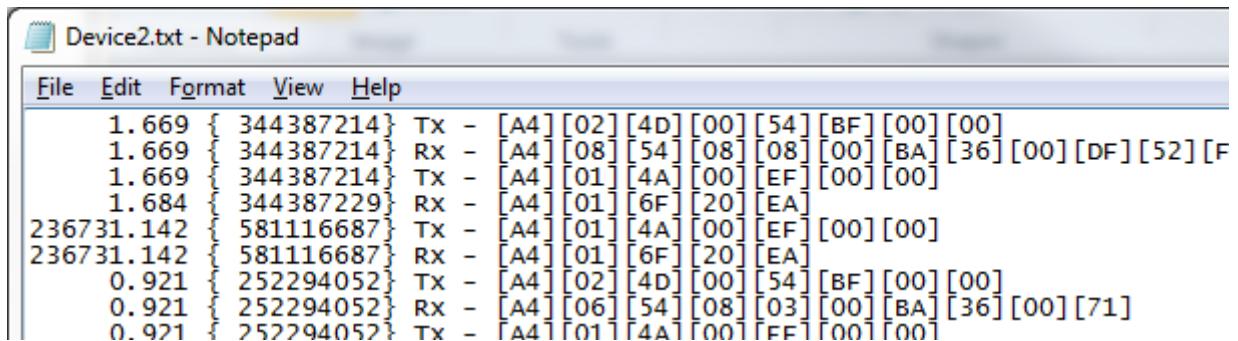


Figure 4-3. Example Device File

4.4 Tools

The tools menu provides access to AutoANT to run scripts on the ANT device, as well as to channel 'Statistics'.

4.4.1 AutoANT

ANTware II allows for running scripts that control an ANT device using AutoANT (Figure 4-4).

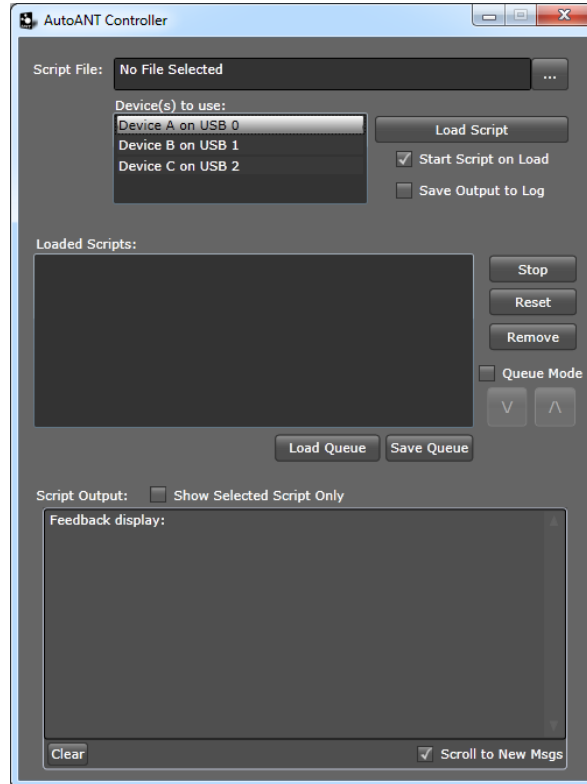


Figure 4-4. Tools-> AutoANT Window

4.4.1.1 Load Script

This feature loads a script file of .ants type that can later run on an ANT device. If the 'Start Script on Load' option is selected, once the script is loaded, it will immediately begin executing. Script files contain sequences of ANT messages that can be sent to the device. For more information about the syntax of .ants scripts, and sample scripts, please refer to the ANTware II section of the ANT developer forum on www.thisisant.com and to the AutoANT Scripts Application Note (AN17).

4.4.1.2 Loaded Scripts Controls

Once a script is loaded, you can use the controls to start and stop the script, as well as to reset the script, or remove it from the application.

4.4.1.3 Queue Mode

This feature allows you to queue multiple scripts, and run them one after the other.

4.4.2 Statistics

ANTware II provides detailed statistics describing the communication on specific ANT channels (Figure 4-5).



Figure 4-5. Tools-> Statistics Window with optional RSSI

4.4.2.1 Channel

Check the checkbox next to the channel number to enable statistics collection for that specific channel. If the channel is already open, statistics collection will begin immediately, and will stop once the checkbox is unselected.

4.4.2.2 Channel Statistics Window

This window provides detailed statistics for the channel. Statistics for both transmitted and received packets are available, including, the number of broadcast packets, acknowledged packets, acknowledged message failures/success rate, channel collisions, number of received packets, receive fails, and drops to search. RSSI values are also displayed when received (supported by certain devices only).

5 Technical Notes

Expanders are used in several places to avoid cluttering the user interface. Expanders can be kept open using the enable expanders checkbox in the Settings->Options menu.

All devices displayed in the left pane are open connections to the given physical ANT device. If one of these devices is required for another application, the 'Release' button will allow that device to disconnect from ANTware II and be available to other applications.

The 'Refresh' button at the top of the Available Devices display will scan for additional devices which have been newly connected to the system or have been previously released. Note: this button does not remove devices that have already been detected; this must be done manually with the 'Release' button.

Selecting the 'Manage Broadcast Buffer' option means the application will make a call to set the buffer every time a broadcast occurs.

ANTware II is built on the ANT Managed Library for the .Net environment. The library is fully managed-compliant code which means it simply requires a drag and drop to use in any .Net environment.

6 Functional Reference

A list of the ANT functionality related to its location in ANTware II is provided in this section. Refer to the ANT Message Protocol and Usage document for a summary of the ANT messages.

6.1 Channel Pane

The channel pane contains a tab for each channel.

6.1.1 *Mandatory Channel Setup*

The channel assignment and ID fields in the Mandatory Channel Setup do not have default values and must be set prior to opening a channel:

Config Messages: Assign Channel (including extended assignment byte), Set Channel ID

6.1.2 *Basic*

The Basic tab contains the fundamental and often used functions:

Requested Messages: Get Channel ID, Get Status

Config Messages: Set Channel Period, Set RF Frequency

6.1.3 *Advanced*

The Advanced tab contains the advanced functions:

Control Message: Open in Rx Scan Mode

Config Messages: Set Tx Power, Set Search Timeout, Set Low Priority Search Timeout

6.1.4 *Inc/Exc List*

This tab contains all the functions required to configure inclusion and exclusion lists:

Config Messages: ID List Add, ID List Config

6.1.5 *Serial*

This tab contains UI for using the device SN as the device ID

Serial: Set Serial Number Channel ID (AT3/C7)

6.1.6 *Freq/Prox*

This tab contains UI related to the Frequency Agility and Proximity Search functions

Freq/Prox: Set Proximity Search, Config Frequency Agility (AP2/C7)

6.1.7 *SDU (Selective Data Update)*

This tab contains UI for enabling previously defined Selective Data Update Masks

Config Messages: Set Selective Data Update Mask

6.1.8 *Encryption*

This tab contains UI related to using Single Channel Encryption

Encryption: Set Encryption Mode, Configure Blacklist/Whitelist

6.1.9 RSSI Threshold

RSSI Threshold: Set the RSSI search threshold (ARCT Only)

6.1.10 Messaging

The Messaging area contains functions for controlling the data sent over the RF channel.

6.1.10.1 Broadcast Tab

This tab allows the user to set the data that will be sent as a broadcast message. Each subsequent message will be incremented by 1 every channel period. Recent commands can be resent by using the drop down.

Data Message: Send Broadcast Data

6.1.10.2 Acknowledged Tab

Similarly, this tab allows the user to specify an acknowledged message. On clicking the 'Send Acknowledge' button, a single acknowledged data packet (as specified in the data field) will be sent over the air and then ANTWare II will continue to send the default broadcast messages. Recent commands can be resent by using the drop down.

Data Message: Send Acknowledged Data

6.1.10.3 Burst Tab

The user may use the functions in this tab to send a burst message. The user can select to send a set number of bytes produced by a counter, or to send a file.

Data Message: Send Burst Transfer Packet

6.1.10.4 Extended Tab

This tab allows the user to send a message using extended messaging (for continuous scanning mode applications). Please note that the extended message formats are supported differently in different ANT parts. Please refer to datasheets and the ANT Message Protocol and Usage document for capabilities and more details regarding extended message formats.

AT3: Ext Data Message: Send Extended Broadcast Message

AP2: Data Message: Send Broadcast Message (extended format)

6.1.10.5 General Tab

The 'Manage TX buffer' should be checked in order for the user to control the data. If the 'Display buffer contents every TX' box is checked, then that data that is sent over the RF channel will appear in the Feedback display. If the 'Increment last byte every message' box is checked, then ANTWare II will increment the broadcast

If acknowledged data packets are desired on every channel period, then select the 'Send Ack every TX event'.

6.1.11 Simulation

The simulation area contains functions for controlling responses to messages received. Checking the 'Auto Send Response to Received Msgs' box is used on slave devices. When checked, the user must also specify:

The type of message ANTWare II should respond to

The type of message ANTWare II should respond with

ANTWare II will send the specified message back to the master in reply to each (specified) message received.

6.2 Device Panels

Each Device Panel shows the specific device's capabilities, device-level feedback and device specific commands as detailed in the sections below.

6.2.1 Info/Net

The Info/Net Tab contains the following functions:

Requested Messages: Get Version, Get Serial Number (AT3 only)

Config Messages: Set Network Key, Enable LED, Enable Extended Rx Msgs

6.2.2 Manual

This tab allows the user to set individual request messages and generic write messages. For a request message, the Message ID and channel number is entered, and then the 'Request Message' button clicked. For writing general messages to ANT, enter the message ID, and fill in the Data 1 to Data 9 fields, then click 'Write Message'.

6.2.3 Pwr/CW

This tab contains the functions:

Config Messages: Set Transmit Power (all channels)

Test Mode: Init CW Test Mode, Set CW Test Mode

6.2.4 Adv

This tab allows access to the Device Popout window where UI for device specific advanced commands are provided.

6.3 Device Popout

The Device Popout provides device-level feedback and device specific commands. Script

The Script Tab provides for SensRcore script downloads. For descriptions of these commands see the SensRcore Messaging and Usage Document.

6.3.1 FIT1e

The features in this tab are specific to the FIT1e module.

6.3.2 Cfg/Dbg

The Cfg/Dbg tab provides access to the ANTLibConfig command.

6.3.3 Adv Burst

The Adv Burst tab allows access to ANT advanced burst functionality which is described in the ANT Message Protocol and Usage document. Enabling features as optional will cause ANT to use advanced bursting even if those features are not available on both the master and slave ends of the link. 3 packets per ANT Message are required for 60kbps speeds. Frequency hopping will enable burst packets to be sent on pseudo-random frequencies which may mitigate RF interference.

6.3.4 Encryption

The Encryption tab provides access to set encryption fields for the device including the encryption ID, the user info string, the active encryption key, and encryption keys stored in NVM. Keys stored in NVM can be copied to active memory from here as well. Encryption can be enabled for the channel from the device specific tab in the Channel Pane.

6.3.5 Event

The Event tab allows configuring the Event related functions on those devices that support them.

6.3.5.1 Event Filtering

Events maybe filtered using the Event Filter function. Select one or more of the filterable events from the list box and click apply. Multiple events can be selected in the usual way by holding the Shift and Ctrl keys.

To clear previously filtered events, deselect all events from the list and click apply.

6.3.5.2 Event Buffering

Event buffering can be configured by buffer size or buffer period. If a buffer of a certain size is desired enable buffer size and input the desired size. If buffering for a certain period is desired enable both buffer size and buffer time. Set the buffer size to the max value (0xffff) and set the buffer time to the desired time in multiples of 10ms. Use the drop down to select which type of events to buffer. When all settings are correct hit 'Apply' to assert them on the device.

To clear buffering that has previously been applied set both the buffer size and time to 0 and apply.

6.3.6 User NVM

Allows reading and writing the user NVM to a file. 'Save to File' will read the entire NVM and save it to the desired file. 'Load from File' will read a user file and write the contents to NVM. Files cannot be edited directly within ANTware; an external hex editor should be used.

6.3.7 Selective Data Update

Allows defining SDU masks that may be used by all channels on the device.