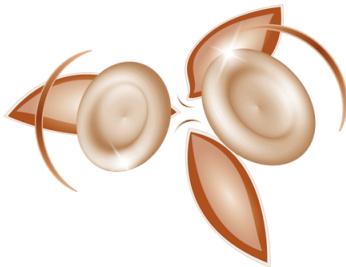




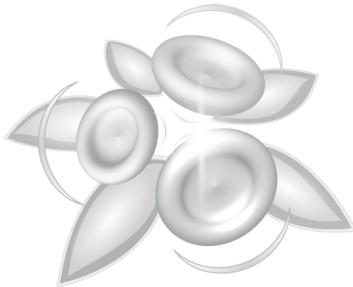
moltosenso  
network manager



IRON



BRONZE



SILVER



GOLD

User Manual



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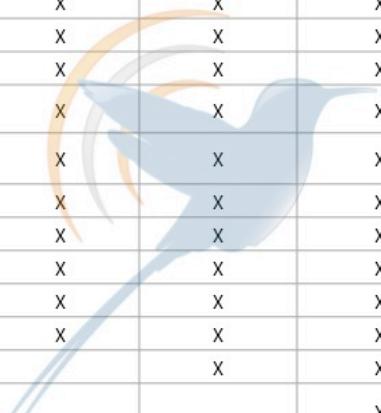
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Latest revision: March 2012.

## Introduction

### About moltosenso® Network Manager™

moltosenso® Network Manager™ software provides powerful tools to configure and remotely manage nodes, and – if possible – *network* of nodes, based on Digi International® modules hardware and syntax; furthermore, it will soon manage moltosenso® **Olkas™** boards. As depicted in Figure 1 the software is provided in four **releases**, available for Microsoft Windows®, Linux® and Mac Os X™:



	Iron 	Bronze 	Silver 	Gold 
Latest release	1.0	1.0	1.0	Q2 2012
Microsoft Windows®	2000, XP, Vista, 7 (32bit and 64bit)	2000, XP, Vista, 7 (32bit and 64bit)	2000, XP, Vista, 7 (32bit and 64bit)	2000, XP, Vista, 7 (32bit and 64bit)
Linux®	deb-32 & deb-64	deb-32 & deb-64	deb-32 & deb-64	deb-32 & deb-64
Mac Os X™	x_64, x_32, PPC	x_64, x_32, PPC	x_64, x_32, PPC	x_64, x_32, PPC
Serial port: manual settings	X	X	X	X
Serial port: auto settings		X	X	X
Serial terminal	X	X	X	X
Firmware upload (local modules) <small>Available on modules supporting bootloader reboot with AT Comm.</small>	X	X	X	X
Firmware upload (remote modules) <small>Only available on Digi XBEE ZigBee modules</small>	X	X	X	X
Parameters settings (local modules)	X	X	X	X
Parameters settings (remote modules)	X	X	X	X
RSSI graphic logger	X	X	X	X
I/O and ADC control (local modules)		X	X	X
I/O and ADC control (remote modules)		X	X	X
Repetitive scripts and routines editor			X	X
Data logger (graphic and file) and Advanced scripts editor (alerts, timers)				X
Single license (web-site download)	See the website	See the website	See the website	See the website
Corporate or multi-license price	Email us for quotation	Email us for quotation	Email us for quotation	Email us for quotation

**Figure 1 Comparative table of moltosenso® Network Manager releases™**

The moltosenso® Network Manager™ **Iron** can be freely downloaded from moltosenso®'s website.

The user can purchase the most complete releases of moltosenso® Network Manager™, the **Bronze**, **Silver** and **Gold** releases, using the e-commerce section of the moltosenso®'s website as well.

## About this manual

This user manual aims at describing the features of moltosenso® Network Manager™ software.

This manual is divided in four main parts:

1. this introduction;
2. setup and configurations;
3. tools to manage the modules;
4. annexes.

In order to help the user to easily find contents, this manual uses different colors in the text, with different meanings:

- ✓ **BLUE**, to identify **Commands or special keywords**;
- ✓ **ORANGE**, to identify the **releases**.

Furthermore, for each feature it is reported which software release contains it, providing the relative logo on the right of the title.

For example the title written in this way:

Automatic Serial Port setup



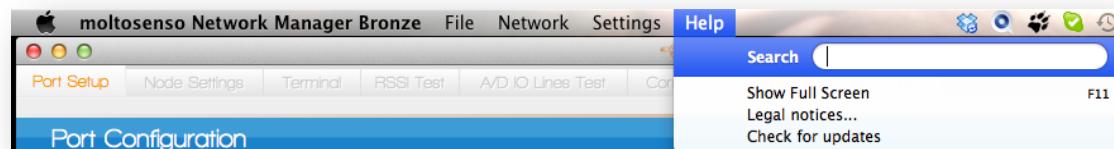
means that the automatic setup of the serial port provided on this software is available for the **Bronze**, **Silver** and **Gold** releases.

## References

- [1] Digi International® modules user manuals. [www.digi.com](http://www.digi.com)
- [2] moltoseno®'s website: [www.moltoseno.com](http://www.moltoseno.com)
- [3] FTDI Drivers and Tools: [www.ftdichip.com](http://www.ftdichip.com)

## Legal Notices

In the Help menu the **Legal Notices** about this software are available.



**Figure 2 Legal Notices in the Help menu**

The Legal Notices state what follows:

**"Copyright © 2009-2012 moltoseno s.r.l. All Rights Reserved.**

**moltoseno, the moltoseno logo, moltoseno Network Manager, the moltoseno Network Manager logo are either registered trademarks or trademarks of moltoseno s.r.l. in Italy and/or other countries.**

**Digi is a trademark of Digi International Inc.**

**Third Party notices, terms and conditions pertaining to third party software and hardware are only incorporated by reference herein."**

## Setup and configuration

### Installation Procedure



The Installation Procedure differs according to the Operating System platform, but it follows the same steps in each of the four releases.

The moltosenso® Network Manager™ software follows the *One License for One User* scheme. For any needed upgrade, just go to the Download page of the moltosenso®'s website and follow the instructions to get another installer (that provides you another *One User License*).

#### Microsoft Windows® 32/64 bit

Once the installation setup has been downloaded from moltosenso®'s website, double click on the setup file and follow the setup wizard.

The user can choose:

1. the language for the installer;
2. the destination folder;
3. the shortcut name in Start Menu;
4. the possibility to create a **Desktop icon** and/or a **Quick Launch icon**.

Finally, the software is ready to be installed, as depicted in Figure 3.

Modules are usually plugged to the computer by means of a COM/USB interface board, as the moltosenso® KRATOS™ 10.06 CO.

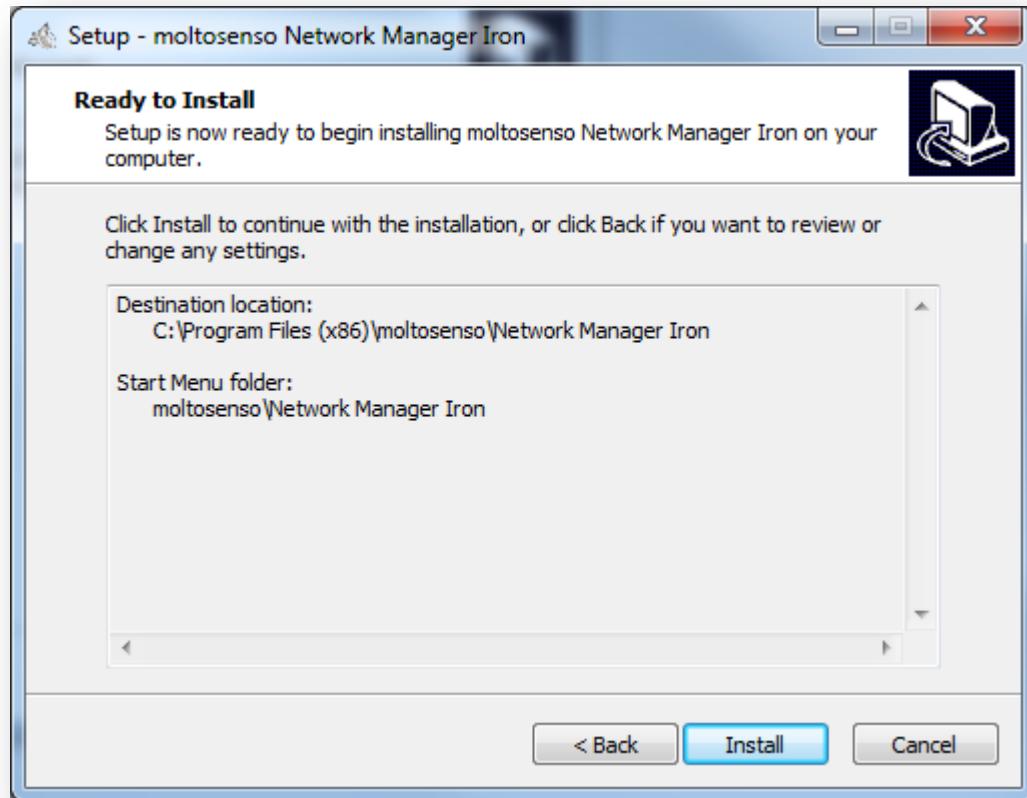
Notice that, regardless of the chosen interface board, in order to use it, the user might need to download or upgrade the FTDI drivers for the Microsoft Windows® Platform at:

<http://www.ftdichip.com/Drivers/VCP.htm>

For further tweaking on FTDI descriptors of the FTDI EEPROM of moltosenso® KRATOS™ 10.06 CO, please read the moltosenso® KRATOS™ 10.06 board user manual and consider to download the [FT\\_Prog](#) utility at:

[http://www.ftdichip.com/Support/Utilities.htm#FT\\_Prog](http://www.ftdichip.com/Support/Utilities.htm#FT_Prog)

In order to uninstall the software, run the [Uninstall program](#) in the Start Menu folder.



**Figure 3 Installation resume for Windows® OS**

Please, notice that, when using an LCD monitor, a better font rendering can be achieved by enabling *ClearType* support under Display Properties in the Control Panel of your Windows® OS. *ClearType* support improves font display quality on color LCD monitor, making fonts smoother and avoiding aliasing.

#### [Linux® 32-bit or 64-bit](#)

For Linux® release follow the standard procedure specific to each Linux® distribution. Be careful to obtain the correct version of the software (32-bit or 64-bit) from the website.

Modules are usually plugged to the computer by means of a COM/USB interface board, as the moltosenso® KRATOS™ 10.06 CO.

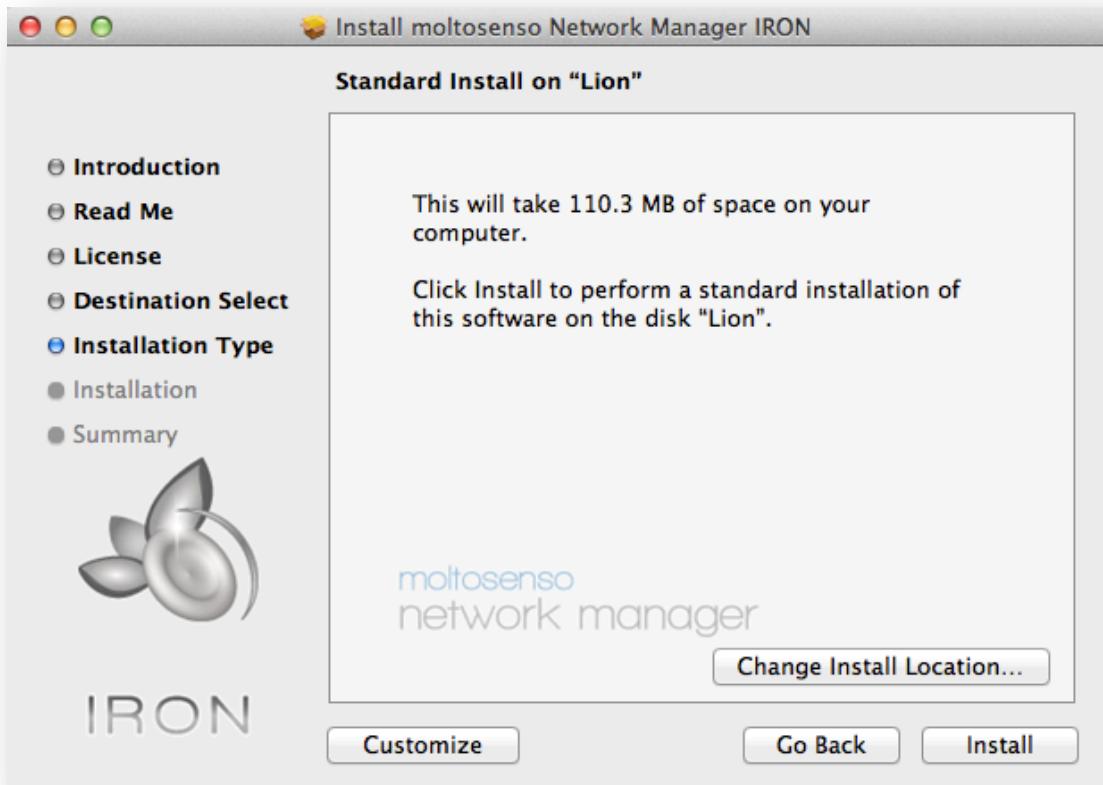
Notice that, regardless of the chosen interface board, in order to use it, the user might need to download or upgrade the FTDI drivers for the Linux® Platform at:

<http://www.ftdichip.com/Drivers/VCP.htm>.

#### [Apple Mac Os X™](#)

If the software is released using a .dmg file, then it is sufficient to double click on it and *drag&drop* the Application bundle in the [Application folder](#).

If the software is provided within an installer (a .pkg file), then it is necessary to double click on the file and follow the instructions to install the software as depicted in Figure 4.



**Figure 4** Installation setup for Mac OS X

Modules are usually plugged to the computer by means of a COM/USB interface board, as the moltosenso® KRATOS™ 10.06 CO.

Notice that, regardless of the chosen interface board, in order to use it, the user might need to download or upgrade the FTDI drivers for the Apple Mac Os X™ Platform at:

<http://www.ftdichip.com/Drivers/VCP.htm>.

In order to uninstall the software, delete the Application bundle from the Application folder.

## Software Unlock



The first time a **Bronze**, **Silver** or **Gold** version is run it needs to be activated.

At the first launch a wizard appears. If the software is going to be activated on a computer with Internet connection, just select **Register your copy** option, then select **Automatically** option on the following page and fill the email field with the email address provided at checkout time on our website.



**Figure 5 Main window of Product Registration wizard**

If the software is going to be activated on a computer without Internet connection, follow these steps:

1. select [Register your copy](#) option;
2. select the [Manually](#) option on the following page;
3. fill the email field with the email address provided at checkout time
4. press the [Save Activation Key File](#) button to download the Activation Key file.
5. Using a computer with Internet connection, visit the following link:  
<http://lb.moltosenso.biz/activate/product>
6. upload the Activation Key file on the website by clicking the Choose File button;
7. by clicking on the Activate button, the website provides you the License Key file that you need to save and use on the previous computer;
8. by coming back on the first computer without the Internet connection where you are going to install the software select, from the first page of the wizard, the option [Activate your copy](#);
9. on the next page, insert the email address provided at checkout time and upload the License Key file using the [Load License Key File](#) button and click [Next](#): the software is successfully activated.

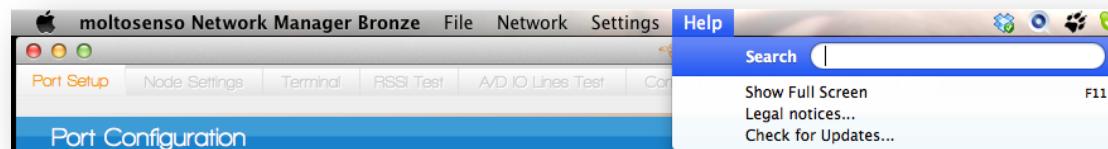
If the process does not end up successfully, you can retry ensuring that the email you are trying to register the software with is the same provided at checkout time. For any further problem, please send the Activation Key that the software shows on the Error page to: [support@moltosenso.com](mailto:support@moltosenso.com).



## Software Update

If connected to the Internet, the software is able to automatically check for Updates, providing a download link if a new release is available.

The user can perform a [Check for Updates](#) by clicking on the corresponding option in the [Help](#) menu.



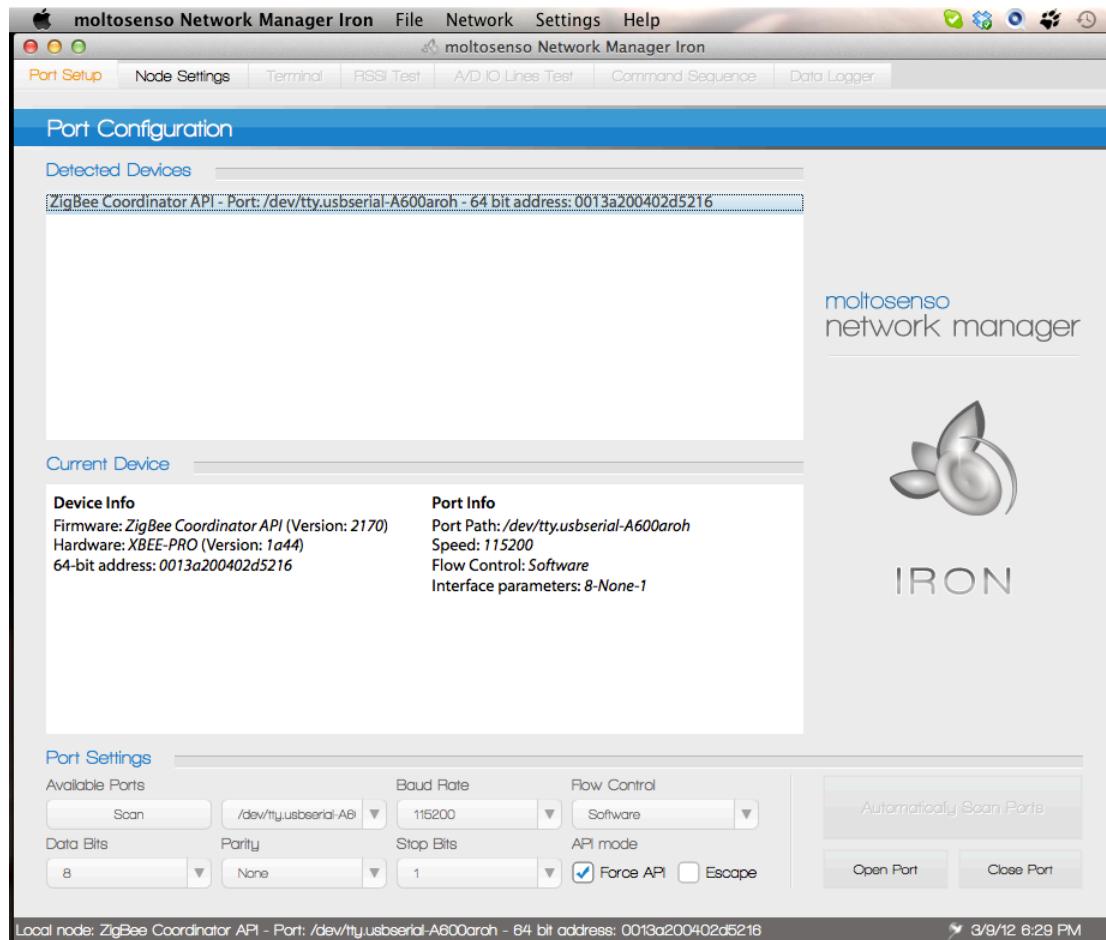
**Figure 6 Check for Updates in the Help menu**

## Serial Port Setup

Double-clicking on the corresponding program icon can run the unlocked software.

Within this software, it is possible to setup [the serial port](#) to communicate with the devices, setup [the network](#) and, finally, it is possible to setup [each single device parameters](#).

The landing Tab, shown in Figure 7 is the [Port Setup Tab](#), that allows setting up parameters for the communication between this software and the devices plugged on COM/USB ports of the computer.



**Figure 7 Serial Port Setup Tab of moltosenso® Network Manager™**

Each port can be set up in two ways:

1. manually (**all releases**);
2. automatically (available only on **Bronze, Silver** and **Gold** releases).



## Manual Serial Port setup

1. Plug nodes equipped with Digi International® **modules** on the COM/USB port
2. Scan the ports by clicking on the **Scan Ports** button
3. select the interested port from the dropdown menu under **Available Ports**
4. Choose **Baud Rate**, **Data Bits**, **Parity Bit** and **Stop Bits** according to the configuration of the selected device
5. chose the desired **Flow Control**
6. Select the **Force API** checkbox and then chose the API mode (1 or 2, e.g. escaped)
7. Click on the **Open Port** button

Notice that:

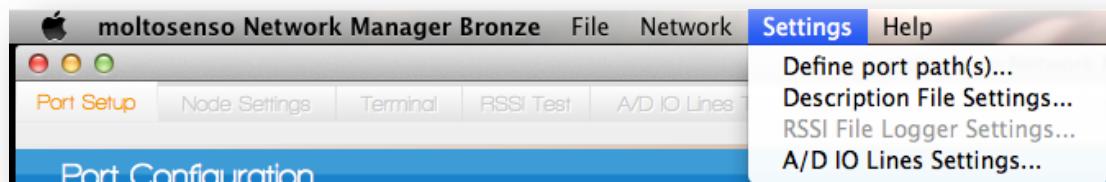
- ✓ if the plugged device does not show up in the **Available Ports** dropdown menu, it might be necessary to download or upgrade the FTDI drivers at: <http://www.ftdichip.com/Drivers/VCP.htm>;
- ✓ if an End Device is in **sleep status**, then it could not show up. It is preferable to use **Hardware Flow Control** for assured responses;
- ✓ the user must remember the port parameters of the device in order to communicate with; otherwise the Automatic Scan Port feature of **Bronze**, **Silver** and **Gold** releases can do it for you; for brand new (or just flashed) devices, the default parameters are shown on the user manual of the Digi International® device;
- ✓ by selecting the **Force API** checkbox, the software is forced to communicate with the device in API mode. This is useful with such those devices that are flashed with *both* AT and API firmware (i.e. Digi International® XBEE-PRO® 868 RF modules).
- ✓ the Open Port operation causes the **stop** of the **ongoing operations** and the complete resume of the port. The software warns about it; the warn can be hidden until the next execution of the program, maintaining the same - but hidden - behavior described above;
- ✓ under Unix® and Mac Os X™, the path of serial port(s) can be set using the **Define port path(s)...** option under the **Settings** menu as shown in Figure 8. User can define multiple path separating them by a semicolon '.'. Moreover, the wildcards '\*' (any string of characters) and '?' (any single character) can be used.

For example, on Unix systems, default paths are '/dev/ttyusb\*' and '/dev/ttyS?', meaning that serial ports will be detected if they have the following paths: /dev/ttyusb0, /dev/ttyusb1, /dev/ttyusb2, ... /dev/ttyusb99, .., /dev/ttyusb999, ... and then /dev/ttyS0, /dev/ttyS1, /dev/ttyS2, ..., /dev/ttyS9. To speed up the automatic scan of ports, consider removing from path definition the '/dev/ttyS?' entry, to search USB serial ports only.

On Mac Os X™ systems, the default path is '/dev/usbserial\*!'.

After opening the port, the device shows up in the [Detected Device](#) pane.

Select the device by clicking on its description and further information appears in the [Current Device](#) pane. Now, this becomes the current device and it is possible to use it. Notice that, each time the user changes the selected device, then the software informs that the operation will cause the stop of the ongoing operations.



**Figure 8 The Settings menu**

Since the software is able to automatically recognize the current module type, then it enables the correct Tabs and functionalities available for that combination of device and software release.

Now it is possible to use the software to manage the Current Device and to manage – if supported – the network of nodes addressable through it.

Notice that:

- ✓ modules flashed with AT firmware are not able to send remote AT commands toward other networked nodes. Consequently, if an AT module is selected as Current Device, then the software disables those functionalities that imply exchange of remote AT commands (in order to investigate more on this topic, please refer to the user manual of the Digi International® device).

In order to discover devices wirelessly addressable by the Current Device a **Network Discovery** must be performed by clicking on the Network Discovery command in the **Network** menu.

### Automatic Serial Port setup



The user might need some help to remember serial port settings of his own devices; the **Bronze**, **Silver** and **Gold** releases of moltosenso® Network Manager™ have a built-in function that is able to automatically detect devices plugged onto the COM/USB ports of the computer.

It is sufficient to click on **Automatically Scan Port** button and the device list shows up in the **Detected Device** pane.

Remember that the Automatically Scan Port function finds all the **awaken** devices at every time it is commissioned, independently if they are flashed with AT or API firmware. The user can select and communicate with only one of the detected device at a time, that automatically becomes the **Current Device**.

Since the software is able to automatically recognize the type of current device, then it enables the correct Tabs and functionalities available for that combination of device and software release.

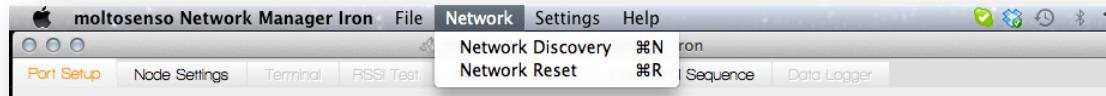
Now it is possible to use the software to manage the Current Device and it is also possible to manage – if supported – the network of nodes addressable through it.

### Network Setup



Network is automatically configured by the communication protocol the modules are equipped with. In order to retrieve the network configuration and topology, so in order to discover devices wirelessly addressable by the Current Device, a **Network Discovery** must be performed, by clicking on the Network Discovery

command in the **Network** menu. This command will populate all the panes in the



**Figure 9 The Network Discovery Menu**

software that allows performing actions on remote nodes.

Finally, in order to reset values and data related to the network, a **Network Reset** can be performed, by clicking on the Network Reset command in the Network menu. This command will delete all previous data.

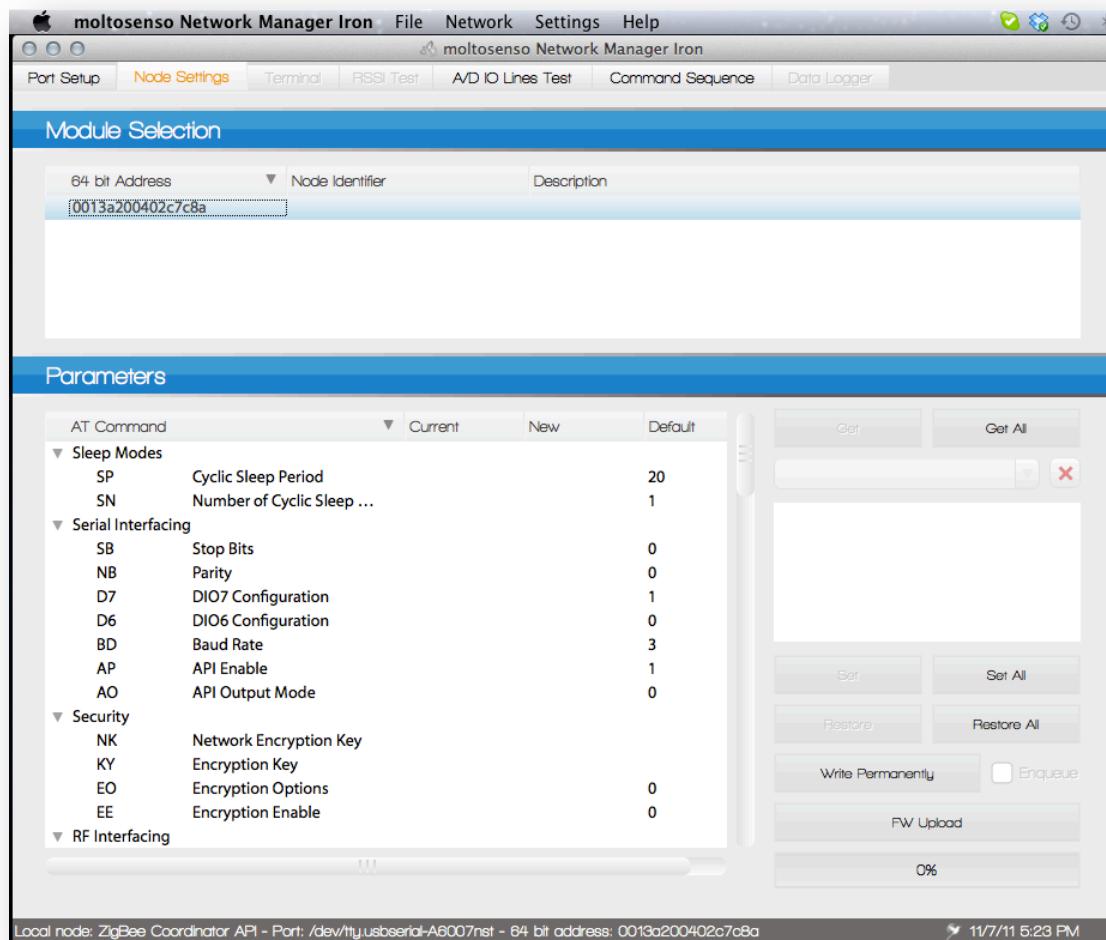
## Node Setup



The Node Settings Tab allows the user to retrieve and set – if allowed – the AT Parameters of the selected device. This functionality is available for **all releases** of moltosenso® Network Manager™ software.

As shown in Figure 10, when the device is selected, only the **default parameters** column is automatically populated with values taken from the configuration files provided by Digi International® for the recognized module.

*(For a comprehensive explanation of how updating configuration files, please refers to Annex A of this user manual)*



**Figure 10 Node setup using the Node Settings Tab**

On the right side of the tab, actions to be performed on AT commands are located:

- ✓ by clicking on each parameter a textual **description** can be obtained;
- ✓ **GET** – if possible – the current value of the parameter selected in the left pane;
- ✓ **GET ALL** the current values of the parameters of the selected device;
- ✓ **SET** – if possible – the value of a single parameter. Based on the selected parameter, the relative value can be set by writing in the SET textbox above the description or by selecting the enumerated option of the SET dropdown menu that appears in place of the aforementioned textbox. Notice that, first of all, the parameter must be selected from the list on the left, then the corresponding value can be changed; finally the SET button must be clicked to set the parameter on the volatile memory of the module. The red cross can be used to delete values entered in the SET box;
- ✓ alternatively to setting a single parameter, it is also possible to change the values of several parameters and then set them all together (commands are actually commissioned serially), by clicking on **SET ALL**;
- ✓ **RESTORE** the default value for the selected parameter;
- ✓ **RESTORE ALL** the default values for the whole parameters;
- ✓ **WRITE PERMANENTLY** the previously set values on the device's EEPROM;
- ✓ **ENQUEUE commands** in order to ask the device to memorize the set action of an AT command without executing it (remember that the ENQUEUE command has no effect of the get action of an AT Command). The command is executed whenever an Apply Change AT Command is issued or any non-Enqueue AT Command is issued after it (in order to investigate more on this topic, please refer to the user manual of the Digi International® device). Remember that, if the ENQUEUE checkbox remains checked, then it will affect the set action of all the incoming commands. Uncheck it if commands must not be enqueued.

Notice that:

- ✓ by selecting the device from the upper pane it is possible to change its mnemonic string location, that will be saved internally in the software (it will not be commissioned to the device); this change affects also the mnemonic string location shown in the RSSI Test Tab and the A/D IO Lines Tab. moltosenso® Network Manager memorizes mnemonic strings in a text file whose path can be set from the [Settings](#) menu, selecting the [Description File Settings...](#) option.
- ✓ the SET textbox does not accept values out-of-range (please refer to the device User Manual)
- ✓ the firmware is written in such a way that the SET operation for a parameter does not affect the node permanently, but only until it is plugged on a source;
- ✓ if the user wants to set permanently a value, the value must be SET first and then the WRITE PERMANENTLY button must be clicked in order to write the value on the device EEPROM. Remember that EEPROMs memories have a finite number of writing chances (in order to investigate more on this topic, please refer to the user manual of the Digi International® device);
- ✓ if a module flashed with an AT firmware is selected as Current Device, then it is not possible to show settings for other remote nodes.

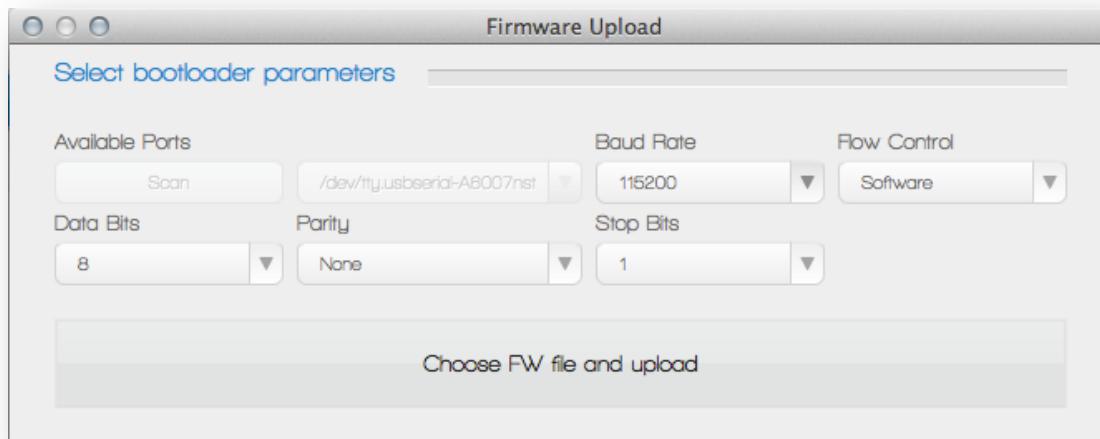


## Firmware Upload

The user who needs to flash another firmware to his module can take advantage of the Firmware Upload feature available on **all releases** of moltosenso® Network Manager™ software.

In order to access this feature, follow next steps:

1. go to the [Node Settings Tab](#);
2. select the device that must be flashed from the upper pane;
3. click on the [FW Upload](#) button in the low right part of the Tab (the application alerts that all the ongoing operation are going to be stopped);
4. a pop-up shows up if a local node has been chosen; here the user must set [Baud Rate](#), [Data Bits](#), [Parity Bit](#) and [Stop Bits](#) that must be used to communicate with the bootloader of the selected device (*please refer to the user manual of the Digi International® module to discover them*);
5. after previous parameters has been set or if a remote node has been chosen (step 4 is skipped in this case), the user is directly asked to choose the desired firmware file from the browsed folder;
6. by clicking [Open](#), the upload procedure starts automatically.



**Figure 11 The Firmware Upload pop-up**

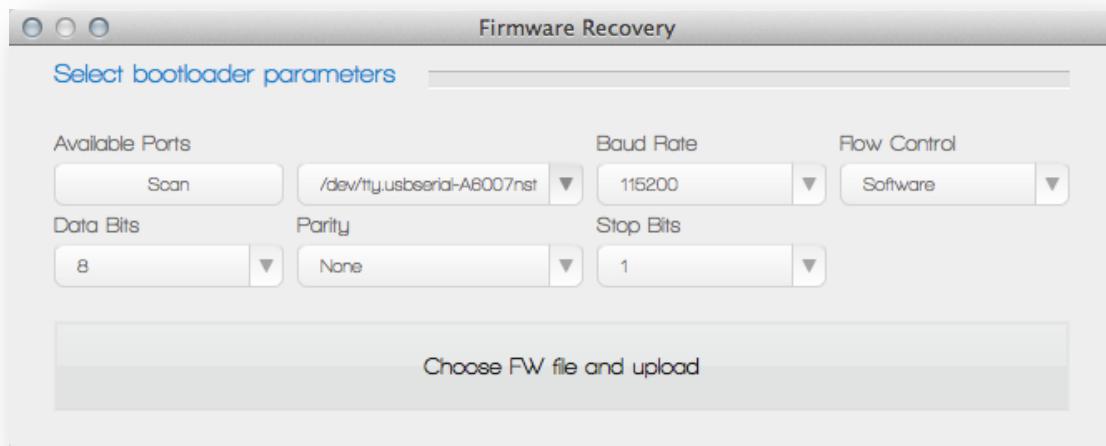
The software needs few minutes to recall the bootloader of the selected device and to inject the new firmware on its memory.

If something goes wrong during the firmware upload, normally the software is unable to open the port of that device again, since it is still *out-of-line* (i.e. the bootloader is in the upload status). So, in order to restore the device, the user must click on the **File menu** and select the **Firmware Recovery...** option.



**Figure 12** The File menu

The user is asked to manually set **Baud Rate**, **Data Bits**, **Parity Bit** and **Stop Bits** that must be used to communicate with the bootloader of the selected device (*please refer to the user manual of the Digi International® module to discover them*).



**Figure 13** The Firmware Recovery pop-up

Remember that Firmware Recovery can be performed on local device only.

Notice that:

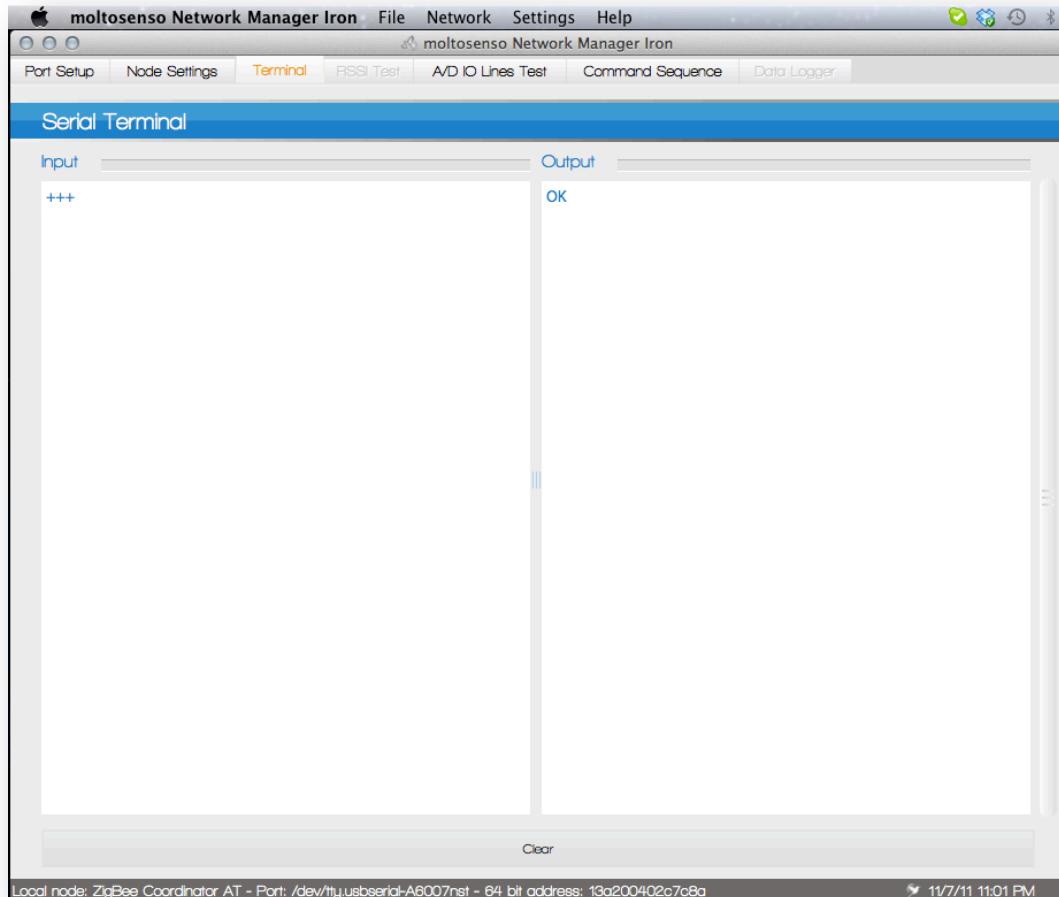
- ✓ firmware can be provided both by Digi International® or third parties;
- ✓ moltosenso® is not responsible for the reliability of the firmware, since moltosenso® Network Manager™ is only a tool to allow the flashing of a file on an embedded device;
- ✓ moltosenso® Network Manager™ software comes with the latest releases of Digi International® firmware. If the desired firmware is not provided, please refer to the Digi International® website;
- ✓ the software is able to upload only file with .ebl extension;
- ✓ the firmware upload procedure on a local node will abort any ongoing operation
- ✓ the firmware upload procedure on a remote node will abort any ongoing operation on the involved node and temporarily suspend any other operation on other nodes, until the procedure is finished (correctly or not).

## Tools and functionalities

### Terminal



The user who needs to communicate with Digi International® modules, flashed with an AT firmware, can use the Terminal Tab tool, available for [all releases](#).



**Figure 14 The Command Sequence Tab**

Remember that, the Terminal Tab is active only if the Current Device has an AT firmware flashed on it and it is divided into two parts.

On the left box, in the [Input Box](#), the user can input serial data to communicate with the local device in [Transparent Mode](#). In order to communicate with a remote node in Transparent Mode, the user must previously define the “DH” and “DL” AT commands on the local node.

On the right box, in the [Output Box](#), the user can read the device (local or remote) response at each single issued AT command or at each written data.

Please refer to the user manual of the Digi International® device to learn about Transparent Mode communication and relative way to issue data and AT commands to the nodes.

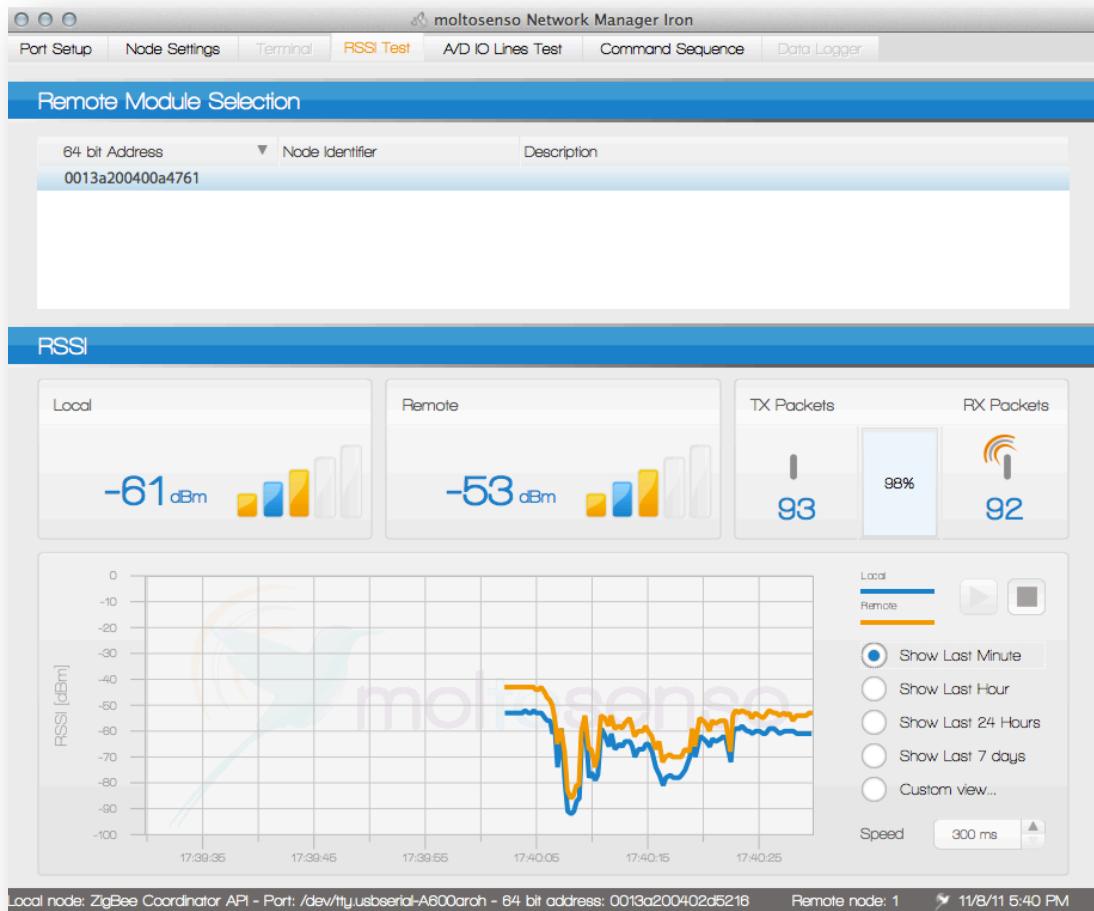
## RSSI Test



After a Network Discovery command, if remote nodes have been found and the model supports this kind of test, then it is possible to perform an [RSSI test](#) between the Current Device and one of the discovered remote devices.

Steps to perform an RSSI test:

- ✓ choose a remote device from the Remote Module Selection list;
- ✓ select the packet transmission period (API mode: range from 300ms to 10s, AT mode: range from 3s to 10s);
- ✓ select a suitable scale for the plot;
- ✓ click on the start button.



**Figure 15 The RSSI test Tab**

The first two widgets in the middle of the Tab give an instantaneous idea of the RSSI value measured on both the local node (on the left) and on the selected remote node (in the middle). They report the instantaneous numerical value and the corresponding representation with a bar graph. Furthermore, the widget on the right provides the number of sent and received packets and the [Packet Error Rate \(PER\)](#), so the ratio between sent and received packets.

In the lower part of the Tab there is the plotting area, where the behavior in time of the RSSI for both the local and the remote device is shown.

The following table describes the action that can be performed on the plot:

Action	Windows®	Linux®	Mac Os X™
Zoom in area	Hold down Left button of the mouse while “dragging” the cursor over the interested region, then release.  OR  Rotate the Scroll Wheel of the mouse while cursor is on the interested region.		
Restore default view	Click on the Scroll Wheel of the mouse.  OR  Left-Right Click of the mouse.		CTRL + Left-Click
Move curves within the plot	Hold down Right button of the mouse while “dragging” the cursor on the plot to move it, then release.		Hold down CMD, then Left-Click of the mouse while “dragging” the cursor on the plot to move it, then release.

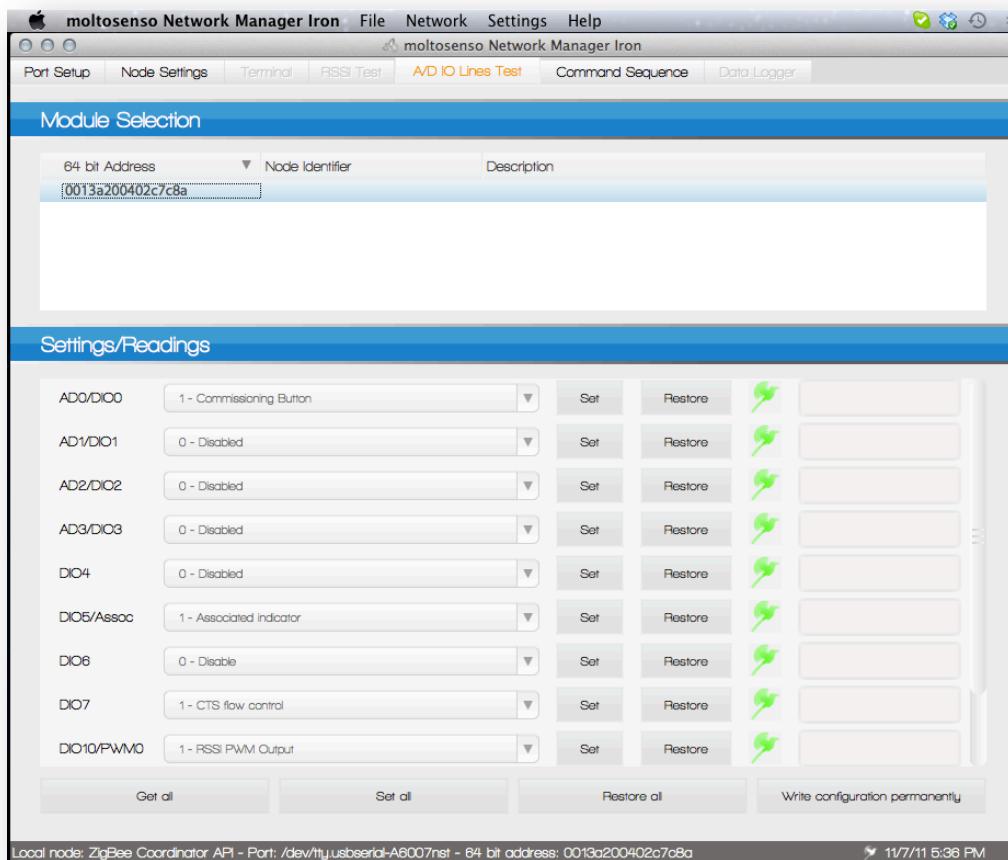
Notice that:

- ✓ by selecting the remote device from the upper pane it is possible to change its mnemonic string location, that will be saved internally in the software (it will not be commissioned to the device); this change affects also the mnemonic string location shown in the Node Setup Tab and the A/D IO Lines Tab. moltosenso® Network Manager memorizes mnemonic strings in a text file whose path can be set from the [Settings](#) menu, selecting the [Description File Settings...](#) option.
- ✓ The RSSI test works on modules flashed both with API and AT firmware. The user must only be careful not to mix API modules with AT modules that will not communicate together.
- ✓ in case of modules flashed with AT firmware, the RSSI value measured on the remote node cannot be shown because the modules does not have piggybacking capabilities to autonomously return this value to the local node.
- ✓ while the test is running, if the user selects another remote node, then the three middle widgets reset, while the plot does not, in order to continuously compare link quality among different nodes toward the Current Device.
- ✓ While the RSSI test is running, it is also possible to [Save](#) the logged values. RSSI Data logging can be enable from the [Settings](#) menu, selecting the [RSSI File Logger Settings...](#) option, by checking the checkbox on the top left of the window. Data from each node can be logged both on a single file or on separate files. Every time the user selects existing file(s), the software asks if the file(s) must be overwritten or if the data must be appended after the old ones. When the user is going to create a new file, current date and time can be appended on the file name.



## A/D IO Lines Manager

The Digi International® XBEE™ modules have a certain number of I/O and ADC lines that the user might want to control with a powerful and intuitive interface, the A/D IO Lines Tab, available on **Bronze**, **Silver** and **Gold** releases.



**Figure 16 The AD I/O Lines Test Tab**

The functionalities of this Tab are particularly useful when the user wants immediate responses from the I/O lines of the selected XBEE™ module, without retrieving them using the respective AT commands of the node.

The steps to be followed are very simple:

- ✓ choose a device from the [Module Selection](#) list;
- ✓ act on the dropdown menu of the interested I/O lines (the green led becomes red, which indicates that the value has been changed in the software, but not commissioned to the module);
- ✓ continue and perform the aforementioned action on all interested I/O lines;
- ✓ click on the [SET ALL](#) button so that the leds turn green again (this means that the value is now changed also on the module);
- ✓ click on the [GET ALL](#) button to get – if allowed – the value from all the I/O lines.
- ✓ Click on the [RESTORE ALL](#) button if the user needs to restore lines to the default values described in the original Digi International® XBEE™ firmware.

It is also possible to write permanently the setup configuration by clicking on the [WRITE CONFIGURATION PERMANENTLY](#) when the setup is finished.

Notice that:

- ✓ by selecting a device from the upper pane it is possible to change its mnemonic string location, that will be saved internally in the software (it will not be commissioned to the device); this change affects also the mnemonic string location shown in the Node Setup Tab and the RSSI Test Tab. moltosenso® Network Manager memorizes mnemonic strings in a text file whose path can be set from the [Settings](#) menu, selecting the [Description File Settings...](#) option.
- ✓ each line can be set and restored independently;
- ✓ XBEE™ nodes are programmed so the get function is performed on the whole set of I/O lines at every time it is commissioned. For this reason, only the GET ALL function is available, instead of a GET function for each AT command;
- ✓ in case of modules flashed with AT firmware, I/O lines manager is not available for remote nodes;
- ✓ this software is able to treat the analog readings using the following conversion formula, provided in the user manual of the Digi International® device:

$$AS = \frac{DS}{2^{N_{bit}}} V_{REF}$$

AS is the output Analog Sample (in mV), while DS is the digital reading. DS is always in the range 0V -  $V_{REF}$ . Please, remember that  $V_{REF}$  is fixed to 1.2V for Digi International® XBEE™ ZigBee® modules, while for the other Digi International® devices it corresponds to the voltage the user provides to PIN 14 of the module. The software does not automatically recognize these values, so the user must call the [A/D IO Lines Settings](#) window from the [Settings menu](#) and act there on  $V_{REF}$  and  $N_{bit}$  parameters.



## Command Sequence

If the user needs a practical tool to issue repetitively scripts to the nodes of a network, he can use the tool contained in the Command Sequence Tab, available on **Silver** and **Gold** releases.

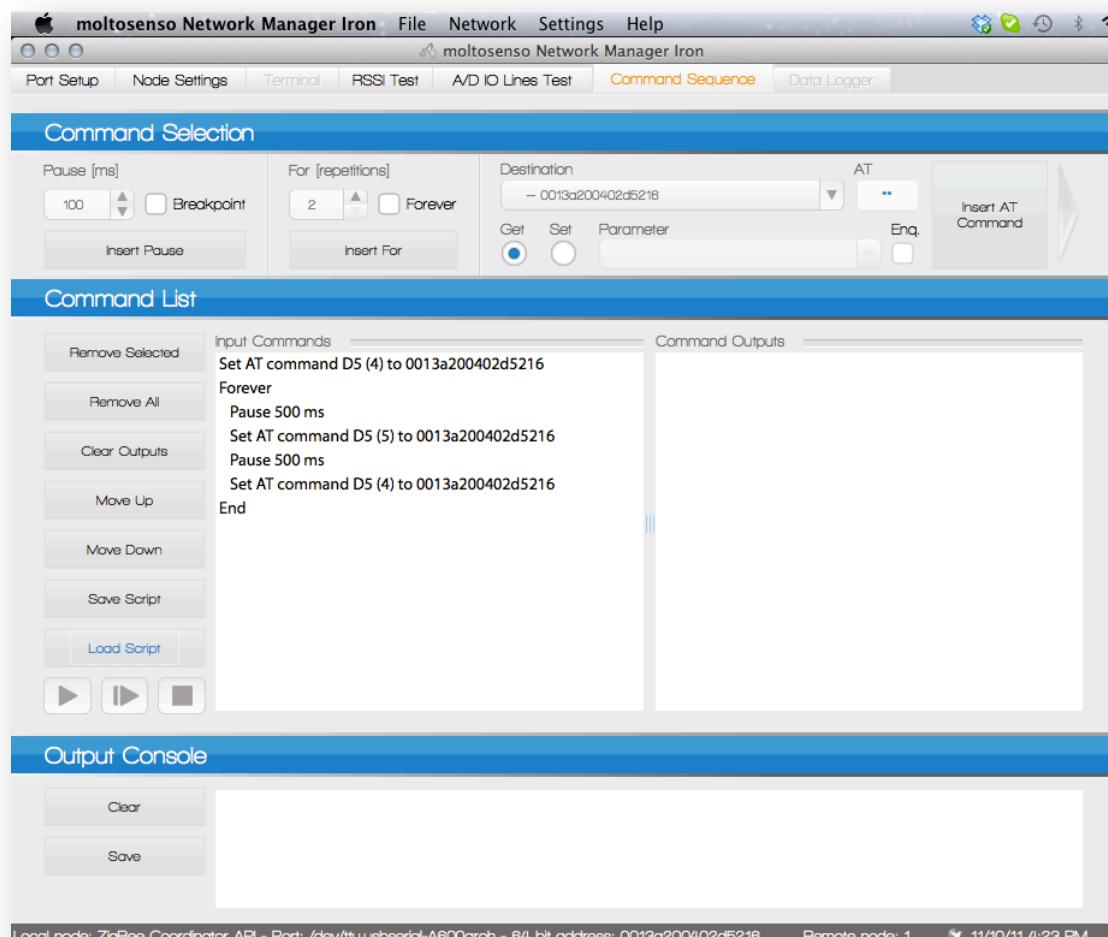
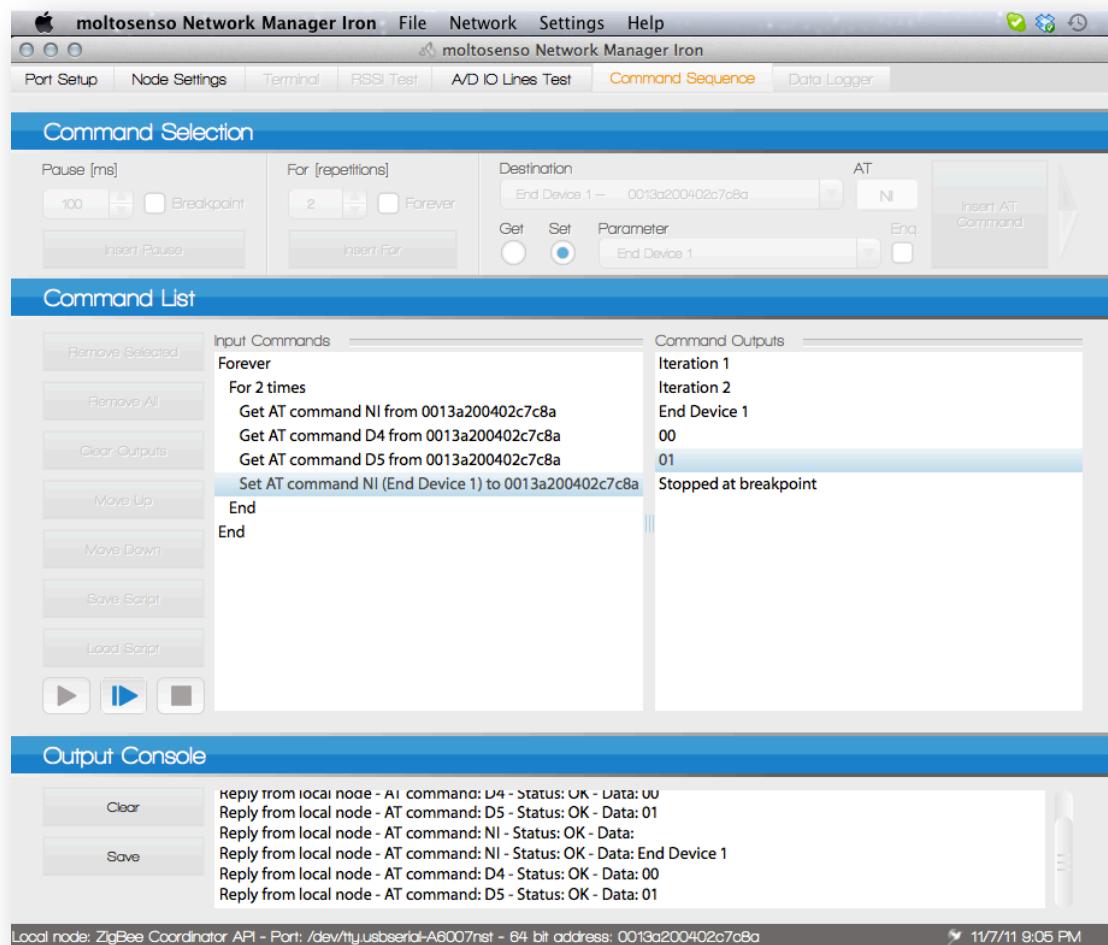


Figure 17 The Command Sequence Tab is populating



**Figure 18 The Command Sequence Tab when a script is executing in the Step-by-Step mode**

In order to fully take advantage of this tool, this user manual introduce the user to the three main sections of the Tab:

- ✓ the upper one is the **Command Selection** area, where the user selects available commands to be executed;
- ✓ the middle part is the **Command List** area, where the script is built and then executed;
- ✓ the lower part is the **Output Console**, i.e. a serial port terminal.

### **Command Selection**

In the Command Selection area, the user can select several instructions and insert them in the **Input Commands** pane below. Remember that, each command is inserted below the selected code line in the Input Commands pane.

The available instructions are:

- ✓ a **Pause** statement between two consecutive commands. This is really helpful when the script must wait a certain amount of time between two consecutive commands; a value in the range from 0s to 10s can be selected and then the **Insert Pause** button must be clicked in order to insert the command in the script that is going to be built in the Input Commands pane;
- ✓ a **Breakpoint** statement, useful for debugging purposes or to allow the user to step over a command. Select the **Breakpoint checkbox** and click on Insert Pause; the running execution will stop on it;
- ✓ a **for** statement to perform N repetitions of a bulk of commands; select a value in the range from 1 to 999 repetitions and click on **Insert For**;
- ✓ if the user needs to repeat the bulk of commands forever, select the **Forever checkbox** and click on Insert For;
- ✓ an **AT command**. Then, in order to correctly insert the AT command in the Input Commands pane, the user must select:

- the **destination node** (the list is populated by means of a Network Discovery); this list cannot contain remote nodes, if the Current local node is flashed with an AT firmware;
- the **AT command** name;
- the action to perform (**GET** or **SET**);
- the **parameter** to SET – if any;
- the **Enqueue checkbox**, if needed, in order to ask the device to memorize the SET AT command without executing it (the enqueue has no effects on GET AT command). The command is executed whenever an Apply Change AT Command is issued or any non-Enqueue AT Command is issued after it (in order to investigate more on this topic, please refer to the user manual of the Digi International® device).

## Command List

In the middle of the Tab there is the **Command List** section. It is sub-divided in three parts. In the very left area, there are several buttons to perform actions on the code of the Input Commands pane:

- ✓ **Remove Selected** removes the selected lines of code in the Input Command pane;
- ✓ **Remove All** removes all the lines in the Input Command pane;
- ✓ **Clear Outputs** remove all the previously received outputs on the serial port;
- ✓ **Move Up** moves up the selected line of code in the Input Command pane;
- ✓ **Move Down** moves down the selected line of code in the Input Command pane;
- ✓ **Save Script** allows to save to file the script as it appears in the Input Command pane;
- ✓ **Load Script** allows retrieving from the hard-disk a script; the script can be a previously saved one, or a manually written one. *(For a comprehensive explanation of how writing scripts, please refers to Annex B of this user manual.)*

- ✓ [Play](#) button allows to start the script execution that terminates at the end of the script or at the next breakpoint;
- ✓ [Step-by-Step](#) button allows executing the script line by line.
- ✓ [Stop](#) button allows stopping the script execution.

In the middle of the Command List section there is the [Input Commands](#) pane, where the scripts is actually built.

On the right, there is the [Command Outputs](#) pane, where the result of the script execution is shown.

### [Output console](#)

In this box the output of the serial port is provided. It can be saved for further analysis or cleared.



## Data Logger

The user who needs a tool to perform advanced data logging can take advantage of the Data Logger Tab, that will be soon available on **Gold** release.

The Data Logger aims at providing an effective tool to control and monitor the behavior of the modules of a network (and their equipment).

Stay tuned on [www.moltosenso.com](http://www.moltosenso.com) for the next available releases.

## Annex A – Upload Firmware Definition



Digi International® constantly updates firmware definitions of its own modules. moltosenso® Network Manager™ software is released with the latest definition available on Digi International® website.

If newer firmware are made available after moltosenso® Network Manager™ installation, they can be downloaded directly from Digi International® website and must be manually unzipped and placed in the correct folder of the moltosenso® Network Manager™ software.

This folder usually reports the name of the module, for example:

- ✓ `xbee_868`, stands for Digi International® XBEE 868 MHz modules;
- ✓ `xbee_wifi`, stands for Digi International® XBEE Wi-Fi modules;
- ✓ `xbee_zb`, stands for Digi International® XBEE ZigBee modules;

and it is placed in the folder called `xbee_firmware`, whose location is platform dependent, as reported below:

- ✓ **Windows®:**      `../installation_folder/conf/xbee_firmware/`
- ✓ **Linux®:**  
`/usr/share/moltosenso/moltosenso_network_manager_{iron,silver,bronze}/xbee_firmware/`
- ✓ **Mac Os X™:**      `../bundle_name.app/Contents/MacOs/conf/xbee_firmware/`

Consider that it is necessary to substitute the *italic* words properly.



## Annex B – Command Sequence Scripts

The Command Sequence tool is able to Save scripts that the user builds in the Input Command pane. Since the script is saved in a .txt file, than the user might want to write the script using a common edit.

```
#      moltosenso® Command Script File
#      Automatically Saved
#      Thu Oct 6 19:14:22 2011
#      The user can add any kind of comment
#      by using "#" character

atset
0123456789abcdef
NI
Coordinator with New Name

atget
0123456789abcdef
NI

pause
100

for
2

atget
0123456789abcdef
DB

pause
300

atget
0013a200402d522a
NI
```

```
atget  
0013a200402d522a  
SH

pause  
200

endfor

for
ever

atget  
0123456789abcdef
SL

pause  
300

atget  
0013a200402d522a
SL

enqueueatset
0123456789abcdef
NI
Another Name

break

atset
0123456789abcdef
CB
1

endfor
```

We provide hereafter the rules to correctly write scripts in text files in order to be well interpreted by the Command Sequence tool.

Command	Meaning	Script appearance in Input Commands pane	Text File appearance
Comment	The script is able to skip this line	-	<i>Previous code [...]</i> # These are comments <i>Following code [...]</i>
Pause [ $t_{ms}$ ]	The script is stopped for $t_{ms}$ milliseconds	<i>Previous code [...]</i> Pause $t_{ms}$ ms <i>Following code [...]</i>	<i>Previous code [...]</i> pause $t_{ms}$ <i>Following code [...]</i>
Breakpoint	The script runs until the breakpoint is reached, then is stopped until the user clicks on Play or on the Step-by-Step button	<i>Previous code [...]</i> Break <i>Following code [...]</i>	<i>Previous code [...]</i> break <i>Following code [...]</i>
For [N]	The script performs the bulk of commands included within the For statement for N repetitions	<i>Previous code [...]</i> For N times ... End <i>Following code [...]</i>	<i>Previous code [...]</i> for N ... endfor <i>Following code [...]</i>
For [ever]	The script performs the bulk of commands included within this statement forever, until the user manually stops the script	<i>Previous code [...]</i> Forever ... End <i>Following code [...]</i>	<i>Previous code [...]</i> for ever ... endfor <i>Following code [...]</i>

Command	Meaning	Script appearance in Input Commands pane	Text File appearance
<b>GET AT Command "CC" on "64bit addr" device</b>	The script interprets this as an AT Command to GET from the addressed device	Get AT command CC from 0123456789abcdef CC	<i>Previous code [...]</i> atget 0123456789abcdef CC <i>Following code [...]</i>
<b>SET AT Command "CC" on "64bit addr" device</b> <b>or</b> <b>SET AT Command "CC(Param)" on "64bit addr" device</b>	The script interprets this as an AT Command to SET on the addressed device  Furthermore, the optional parameter required by setting action can be specified	Set AT command CC to 0123456789abcdef OR Set AT command CC(Param) to 0123456789abcdef	<i>Previous code [...]</i> atset 0123456789abcdef CC <i>Following code [...]</i> OR <i>Previous code [...]</i> atset 0123456789abcdef CC Param <i>Following code [...]</i>

Command	Meaning	Script appearance in Input Commands pane	Text File appearance
Enqueue	The device memorizes the SET AT command without executing it. The command is executed whenever an Apply Change AT Command is issued or any non-Enqueue AT Command is issued after it	Enqueue set AT command CC to 0123456789abcdef OR Enqueue Set AT command CC(Param) to 0123456789abcdef	<i>Previous code [...]</i> enqueueatset 0123456789abcdef CC <i>Following code [...]</i> OR <i>Previous code [...]</i> enqueueatset 0123456789abcdef CC Param <i>Following code [...]</i>

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