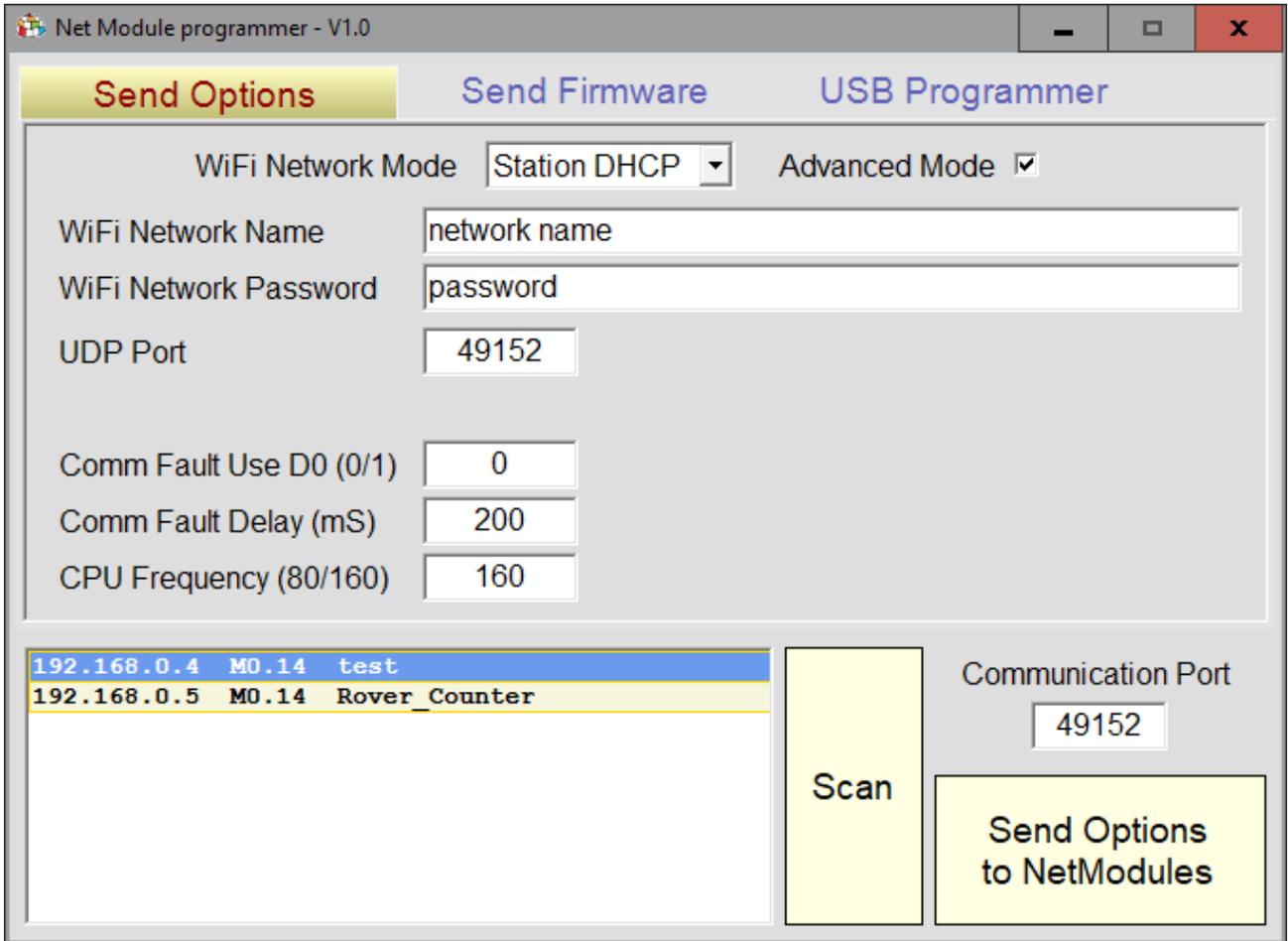


Theremino System



NetModule Programmer

NetModule of Programming

The Net Modules can be in four programming states.

◆ **Not programmed**

Generic WemosD1 modules that you buy on the net, not having received the first program, they are completely inert.

The NetHAL and NetModuleProgrammer applications can not communicate with them and can not program them.

The only way to program them is to connect the USB port and use the utilities provided by the "ExpressIf" manufacturer, as explained in the "NetModule_UsbProgramming" document.

◆ **SoftAP (Access Point Software)**

A NetModule that you buy pre-programmed, turns on in this mode, and is shown in the network with a name, such as "PTP_2E3AE835FC03". Each module has a different number that serves to distinguish and identify it. A password is required for the connection, and you write "password."

The SoftAP mode allows to connect to the module with any device, and configure it with the application "NetModule Programmer".

At any time it is possible to return a module in SoftAP, or with the "Programmer" application, or by placing a jumper between the D0 and the +5V before turning it on.

◆ **Station DHCP**

This is the classic mode. The module connects to the WiFi network like the Tablets and SmartPhones. For the connection it must be configured with the network name and password. It is also necessary that the access point sends the IP address, and therefore have DHCP enabled.

◆ **Station Static**

You use this mode to connect to a network with DHCP disabled. The module, in addition to the network name and password, must have a valid IP address (different from any other device on the network). It must also have a mask (usually 255.255.255.0) and IP gateway (the IP of the access point).

NetHAL and NetModule Programmer applications

Important to note that the two applications can not operate simultaneously.

If a module is connected to NetHAL, it will not appear in the list of NetModule Programmer, and vice versa.

The SoftAP mode

If at the startup, the NetModule has never been configured, it arises automatically in the SoftAP mode, and it is ready to receive the configuration parameters via the NetModuleProgrammer configuration tool, Or to be used in a point-to-point connection.

In SoftAP mode the NetModule emulates the functionality of a WiFi access point, and exposes a WiFi network name, for example, PTP_2E3AE835FC03 (the eight digits are the SoftAP mode MAC address of the NetModule).

This WiFi network is visible and usable by any device with Windows XP, 7 or 10 and with WiFi on the band of 2.4 Ghz.

In this mode the NetModule can be used in point-to-point connection (only one device at a time).

On the PC/Tablet device you use, connects the WiFi network of the NetModule, then start the NetHAL application. The NetModule will then be visible in the NetHAL devices list, named "NoName", and you can use it by configuring their Pins.

Alternatively, you can connect to it with the application "NetModule Programmer" to change the configuration parameters or send a new firmware via WiFi.

Unconditional starting in SoftAP mode

To unconditionally put the NetModule in SoftAP mode you will power on it by holding the pin D0 to high level (+3.3V or +5V).

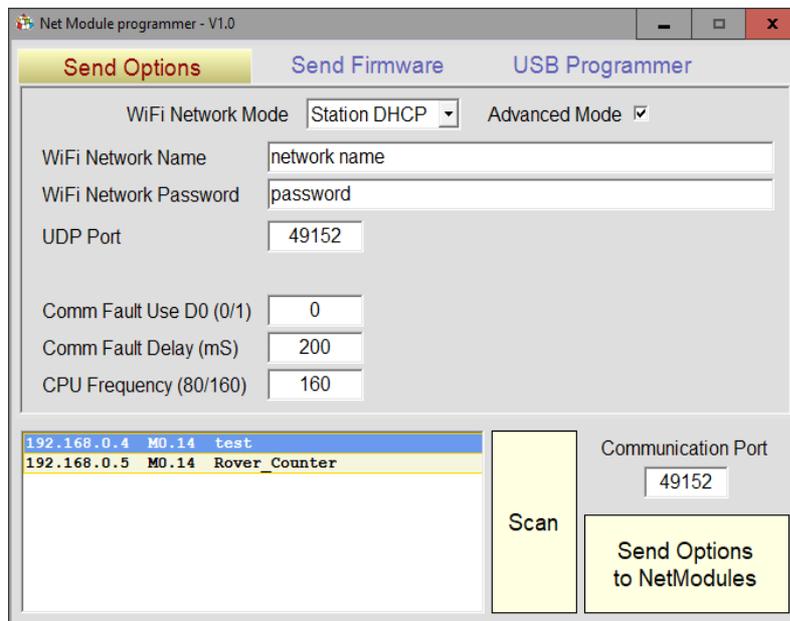
This operation is essential if, due to incorrect changes to the parameterization of NetModule, it is no longer available in the network in any way.

Configuration with the NetModuleProgrammer

The operation should be done in case it is necessary to set for the first time the configuration parameters of the NetModule, or for subsequent variations of them (the detailed description of each configurable parameter will follow).

The procedure for assigning parameters is:

- 1) Turn on the NetModule in SoftAP Mode
- 2) Connect the PC/Tablet used as controller to the PTP_XXXXXXXXXXXX network
- 3) Start the NetModuleProgrammer application
- 4) Set the necessary parameters to achieve the desired connection
- 5) Press the "Send Options to NetModules" button
- 6) Restart the NetModule



In this image you see the NetModule Programmer, ready to program the "test" module.

The modules appear in the list with their IP address, the version of their firmware and their name (which you set with the NetHAL application). To refresh the modules list you press the "Scan" button.

It is possible to select and deselect modules using CTRL and SHIFT, as usual on Windows systems. The button "Send Options to NetModules" program all the selected modules (highlighted in blue).

See the following pages for the programming details.

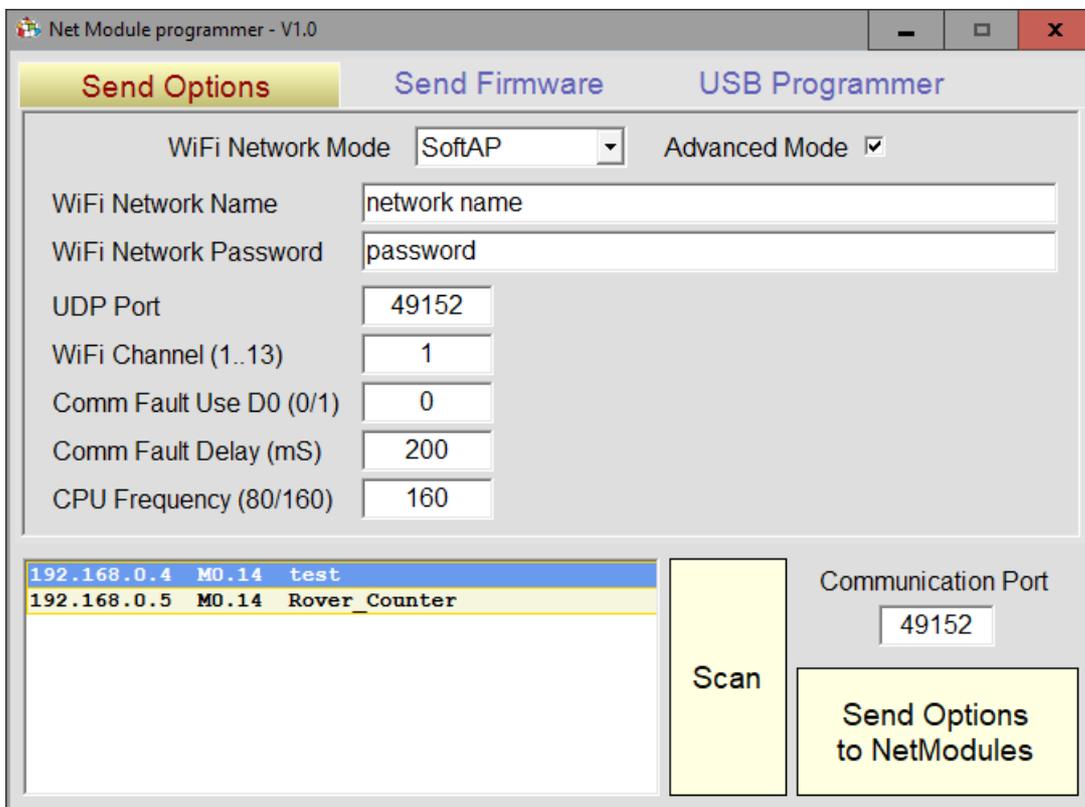
Configure SoftAP mode

A NetModule working in SoftAP mode behaves himself as an Access Point. In this mode it is not therefore necessary to have an Access Point, but you can connect directly to the module with any device.

The connection is point-to-point type, and then you can connect only one device at a time.

This mode can be used for two main purposes:

- ◆ For parameterization of the NetModule.
- ◆ For point-to-point use of the NetModule.



In this image you see the NetModule Programmer, ready to program the "test module", in the "Soft AP" mode.

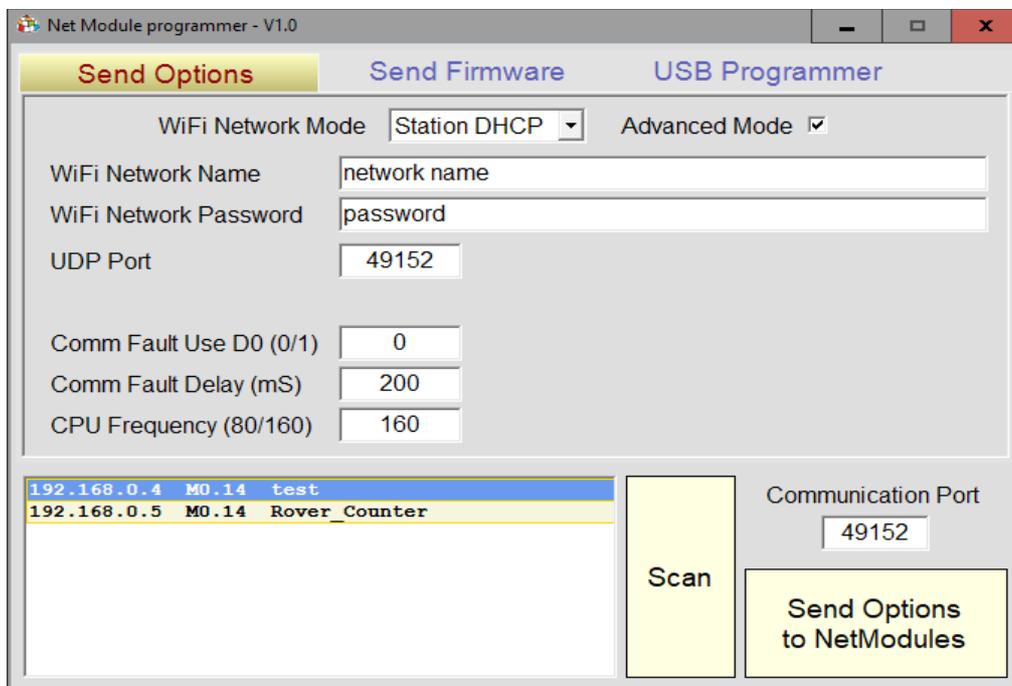
Configure the Station DHCP mode

This is the most simple and flexible way, using which one or more NetModule connect to the WiFi network managed by one (or more) access points, becoming devices that are part of a LAN (Local Area Network).

WARNING: In this mode it is necessary that in the network there is an Access Point or Router on which the "DHCP Server" feature is enabled.

This functionality allows to manage automatically, and in a transparent manner, the configuration of all the devices present on the network, the NetModules in the specific case.

The majority of home LAN are made in this way.



In this image you see the NetModule Programmer, ready to program the "test module", in the "Station DHCP" mode.

Instead of "network name" and "password" you have to put the network name and the password of your Access Point.

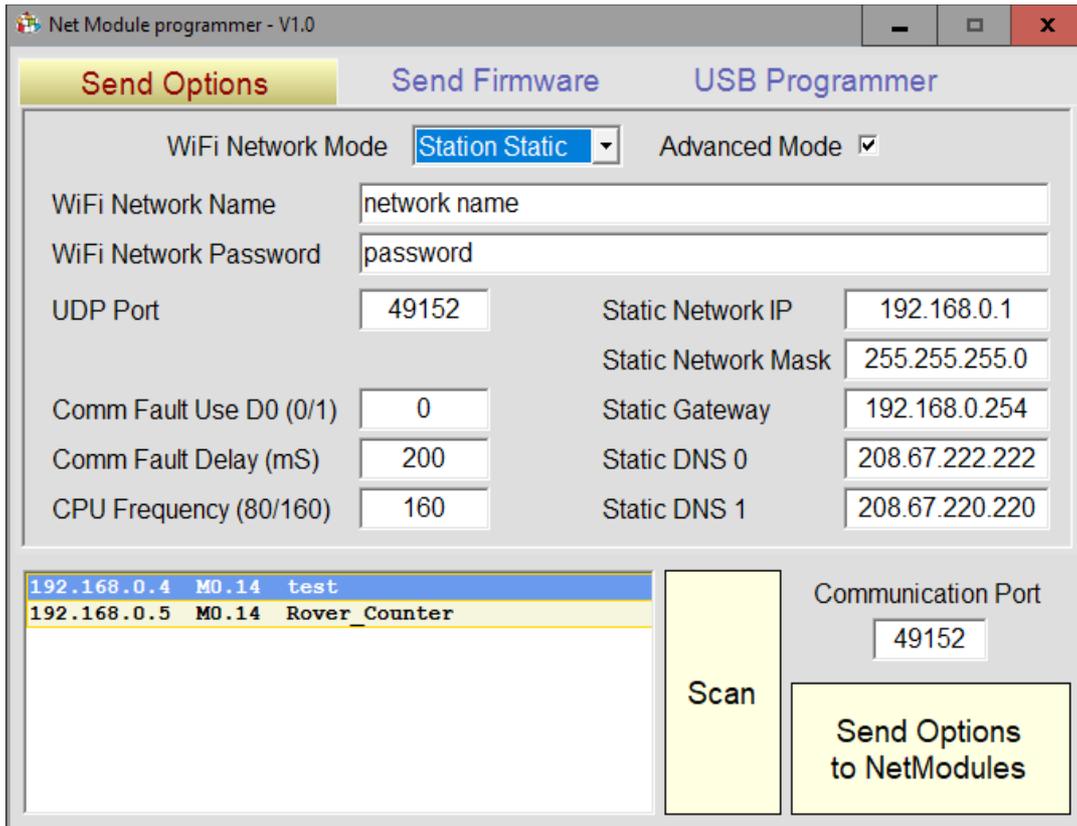
If you fail the module will not connect more, and you will have to bring it back SoftAP (with the jumper A0) and repeat what is written on the page [The SoftAP mode](#).

If you set wrong parameters you will lose a lot of time, so you should be careful to set them right.

Configure the Station Static mode

This mode is similar to Station DHCP, but with the important difference that the configuration of the IP address of each NetModule is set manually with the application NetModule Programmer.

This mode can be used in special cases where it is necessary to have a complete control over the IP configuration of network-connected devices.



In this image you see the NetModule Programmer, ready to program the "test module", in the "Station Static" mode.

Parameters for the SoftAP mode

These relevant parameters for this mode:

- ◆ WiFiNetworkMode SoftAP
- ◆ WiFiNetworkName <WiFi network name> (*)
- ◆ WiFiNetworkPassword <Password of the WiFi network> (*)
- ◆ WiFiChannel from 1 to 13 (*)
- ◆ NetHALUDPPort <UDP port number> (*)
- ◆ StaticNetworkIP (**)
- ◆ StaticNetworkMask (**)
- ◆ StaticGateway (**)
- ◆ StaticDNS0 (**)
- ◆ StaticDNS1 (**)
- ◆ SoftAPLeaseStart (**)
- ◆ SoftAPLeaseEnd (**)
- ◆
- ◆ (*) *The parameter's default value may be changed only in "Advanced" mode*
- ◆ (**) *The parameter's default value cannot be changed*

Parameters for Station DHCP mode

These relevant parameters for this mode:

- ◆ WiFiNetworkMode StationDHCP
- ◆ WiFiNetworkName <WiFi network name>
- ◆ WiFiNetworkPassword <Password of the WiFi network>
- ◆ NetHALUDPPort <UDP port number> (*)

() The parameter's default value may be changed only in "Advanced" mode*

WiFiNetworkName and WiFiNetworkPassword must match those set on the access point.

NetHALUDPPort must match the one set in the Theremino_NetHAL application.

NetHALUDPPort is the UDP port number used for network communication. The 49152 value usually is ok, and should only be changed if it was the port is already in use by another application, on the system that runs the Theremino_NetHAL application. In this case it will also be changed in the communication options of the Theremino_NetHAL application.

The DHCP server on your network will automatically assign to NetModule the following parameters:

- ◆ IP Network
- ◆ Network Mask
- ◆ Gateway (*)
- ◆ Main DNS (*)
- ◆ Secondary DNS (*)

() Optional DHCP parameters*

Parameters for the Station Static mode

In this mode the NetModule connects to a Wifi network managed by one or more Access Points, in which the network configuration of each host, and therefore also in the NetModule, is handled in a static way and set manually.

These are the relevant parameters for this mode:

- ◆ WiFiNetworkMode StationStatic
- ◆ WiFiNetworkName <WiFi network name>
- ◆ WiFiNetworkPassword <Password of the WiFi network>
- ◆ NetHALUDPPort <UDP port> (*)
- ◆ StaticNetworkIP <IP>
- ◆ StaticNetworkMask <Net Mask>
- ◆ StaticGateway <IP>
- ◆ StaticDNS0 <IP> (*)
- ◆ StaticDNS1 <IP> (*)

() The parameter's default value may be changed only in "Advanced" mode*

Other configuration parameters

◆ CommFaultDelay from 100 to 10000

Parameter to set the pin D0 activation delay, by the Wifi communication interruption with the NetHAL application.

This value is expressed in milliseconds

◆ CommFaultUseD0 0 or 1

Parameter to manage the use of the pin D0 interruption of WiFi communication with the NetHAL application.

The vaue 0 means do not use pin D0, 1 means use the pin D0.

◆ CPUFreq 80 or 160

Parameter to change the CPU frequency which results in a lower frequency, in a more modest performance and reduced power consumption.

Value is expressed in MHz.

List of all parameters

These are all parameters that the various configuration modes currently write in the NetModule.

The column on the right list the parameter values when the module has received the first USB programming and are never changed.

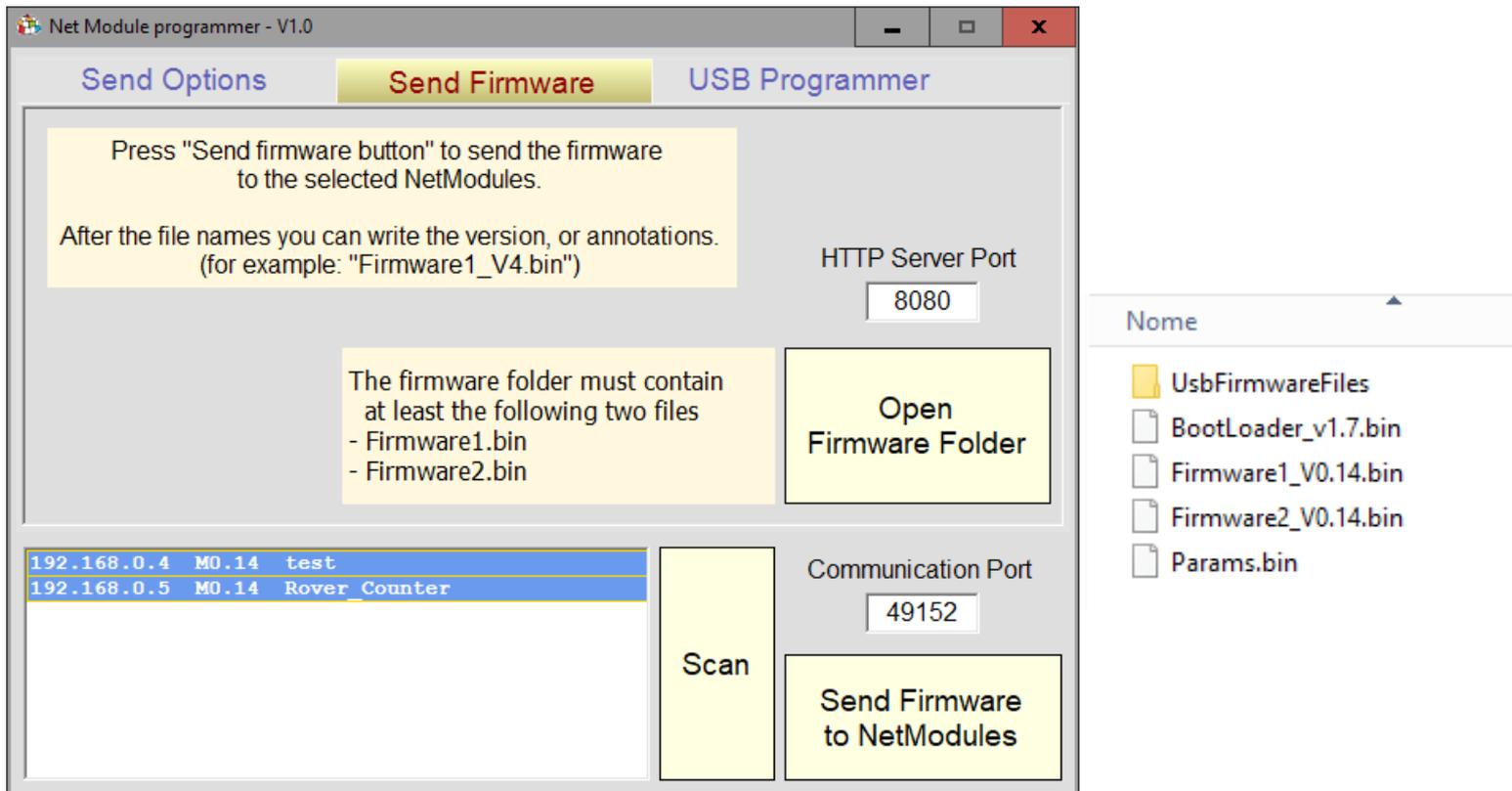
◆ WiFiNetworkMode	SoftAP
◆ WiFiNetworkName	PTP_XXXXXXXXXXXX (for SoftAP mode)
◆ WiFiNetworkName	NoName (for StationDHCP and StationStatic)
◆ WiFiNetworkPassword	password
◆ NetHALUDPPort	49152
◆ StaticNetworkIP	192.168.0.1
◆ StaticNetworkMask	255.255.255.0
◆ StaticGateway	192.168.0.254
◆ StaticDNS0	208.67.222.222
◆ StaticDNS1	208.67.220.220
◆ WiFiChannel	1 (Only used in SoftAP mode)
◆ SoftAPLeaseStart	192.168.0.2
◆ SoftAPLeaseEnd	192.168.0.253
◆ CommFaultDelay	200
◆ CommFaultUseD0	0
◆ CPUFreq	160

Replace the modules firmware

Normally the NetModules are programmed using the latest version firmware.

In the future, if they are improved versions available, you can program the NetModule wireless. This could be very useful for those modules in remote and inaccessible locations.

With the "Send Firmware to NetModules" button, all the selected modules are updated with the new firmware within seconds.



The "Firmware" folder of the NetModule Programmer application, should contain the latest version available firmware files.

The files are "Bootloader", "Params", "Firmware1" and "Firmware2", as seen in the small image on the right. But only the two Firmware files 1 and 2 are used.

If you have the latest firmware, you can open the folder with the "Open Firmware Folder" button, and replace the files before sending them to the modules.

The command "Send Firmware to NetModules" sends only the two firmware files 1 and 2. Since it reprograms the firmware only, the module will restart in the previous state (SoftAP, Station DHCP or Station Static).

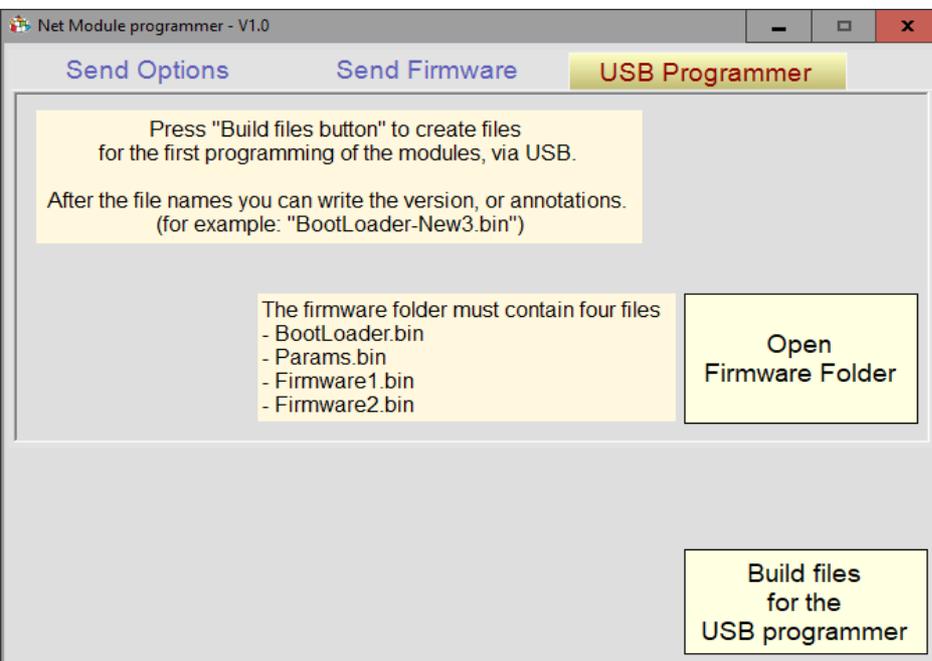
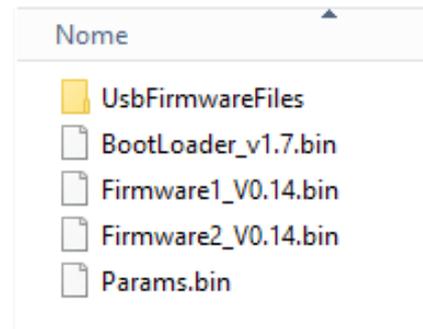
Firmware files for USB programming

The "Firmware" folder of the application NetModule Programmer, should contain the latest version available firmware files.

The files are "bootloader", "Params", "Firmware1" and "Firmware2", as seen on the right.

Program these files with the USB programmer would require two steps. First you should clear all memory, then you should program the file.

To facilitate and speed up the programming these four files can be written in four larger files or even in a single file. These files can then be used to program all of the memory with a single operation.



Pressing the "Build files" button five files are created to be used for the USB programming.

The USB programming is used by those who produce the modules. Normally you should not have a need to use it.

Nome	Ultima modifica	Tipo	Dimensione
FlashAtOffset0x000000.bin	13/01/2018 21:04	File BIN	1.024 KB
FlashAtOffset0x100000.bin	13/01/2018 21:04	File BIN	1.024 KB
FlashAtOffset0x200000.bin	13/01/2018 21:04	File BIN	1.024 KB
FlashAtOffset0x300000.bin	13/01/2018 21:04	File BIN	1.024 KB
FlashComplete.bin	13/01/2018 21:04	File BIN	4.096 KB

The "NetModule UsbProgramming" document explains how to use these files with the application of USB programming.