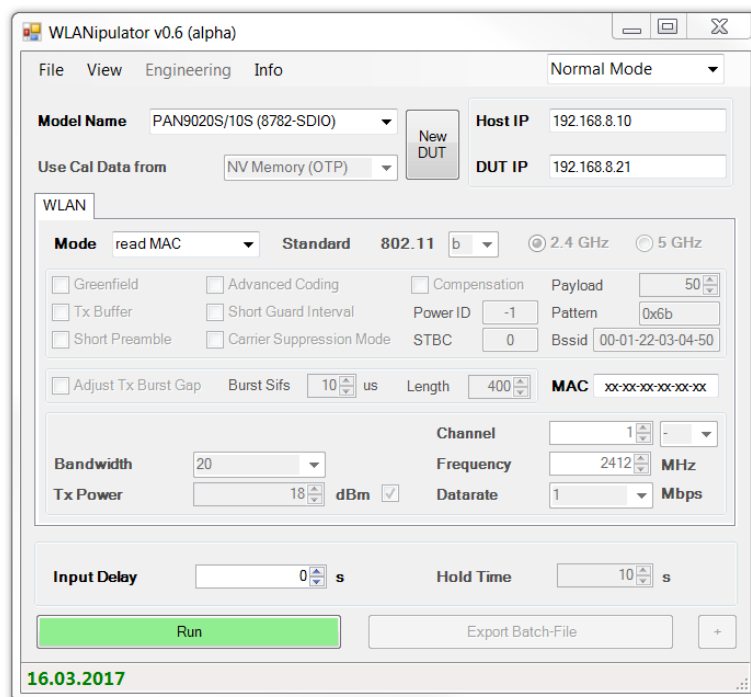**Panasonic**

WLANipulator

Version 0.5.1

User Guide

Rev. 0.1

Wireless Modules

Overview

The WLANipulator is a graphical user interface for easy control of the Marvell® LabTool. The LabTool is a command line application to control the various Marvell® Wi-Fi/BT chip sets with a personal computer. The main target of the WLANipulator is to simplify the handling for the user.

Features

- Start/stop the LabTool
- Control the LabTool
- Display the LabTool log file
- Create batch files to run the LabTool
- Save/load WLAN and Bluetooth settings

By purchase of any of the products described in this document the customer accepts the document's validity and declares their agreement and understanding of its contents and recommendations. Panasonic reserves the right to make changes as required at any time without notification. Please consult the most recently issued product specification before initiating or completing a design.

Disclaimer

The information contained herein is presented only as guidance for Product use. No responsibility is assumed by PANASONIC for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.

- Description of hardware, software, and other information in this document is only intended to illustrate the functionality of the referred PANASONIC product. It should not be construed as guaranteeing specific functionality of the product as described or suitable for a particular application.

- Any provided (source) code or command sequence shall not be used or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.

- Any outlined or referenced (source) code or command sequence within this document is provided on an "as is" basis without any right to technical support or updates and without warranty of any kind on a free of charge basis according to § 516 German Civil Law (BGB) including without limitation, any warranties or conditions of title, non-infringement, merchantability, or fitness for a particular purpose. Customer acknowledges that (source) code or command sequence may bear defects and errors.

- The third-party tools mentioned in this document are offered by independent third-party providers who are solely responsible for these products. PANASONIC has no responsibility whatsoever for the performance, product descriptions, specifications, referenced content, or any and all claims or representations of these third-party providers. PANASONIC makes no warranty whatsoever, neither express nor implied, with respect to the goods, the referenced contents or any and all claims or representations of the third-party providers.

- To the maximum extent allowable by Law PANASONIC assumes no liability whatsoever including without limitation, indirect, consequential, special, or incidental damages or loss, including without limitation loss of profits, loss of opportunities, business interruption and loss of data.

Table of Contents

1 About This Document

1.1 Purpose and Audience

This user guide provides details on the functional and operational characteristics of the Panasonic WLANipulator software. It is intended for hardware design, certification, and OEM engineers. The tool is referred to as "the WLANipulator" or "the software" within this document.

1.2 Revision History

Revision	Date	Modifications/Remarks	Software Version
0.1	22.03.2017	1st preliminary version	0.5.1

1.3 Use of Symbols

Symbol	Description
(i)	**Note:** Indicates important information for the proper use of the product. Non-observance can lead to errors.
⚠	**Attention:** Indicates important notes that, if not observed, can put the product's functionality at risk.
✎	**Tip:** Indicates useful information designed to facilitate working with the module/software.
✓	Indicates a requirement that must be met before you can complete the corresponding tasks.
→	Indicates the result of a task or the result of a series of tasks.
⇨ [chapter number] [chapter title]	**Cross reference:** Indicates crossreferences within the document. **Example:** Description of the symbols used in this document ⇨ 1.3 Use of Symbols.
This font	Indicates fixed terms and texts of the graphical user interface. Example: Click **Save**.
Menu > **Menu item**	Indicates a path, e.g. for accessing a dialog. Example: In the menu, select: **File** > **Setup page**.
[Key]	Indicates a key on the keyboard, e.g.: **[F10]**.

1.4 Related Documents

Please refer to the Panasonic website for related documents ⇨ 9.1.2 Product Information.

2 Product Overview

WLANipulator GUI

The WLANipulator is a graphical user interface (GUI) for easy control of the Marvell® LabTool. The LabTool is a command line application to control the various Marvell® Wi-Fi/BT chip sets with a personal computer. The main target of the WLANipulator is to simplify the handling for the user with regard to engineering, evaluation, and certification.

Please refer to the Panasonic website for related documents ⇨ 9.1.2 Product Information.

3 Installation

3.1 Requirements
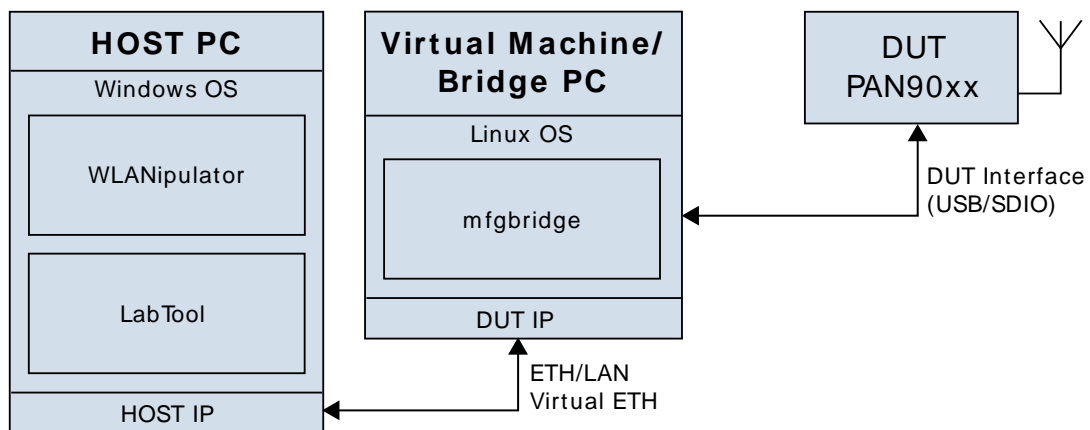
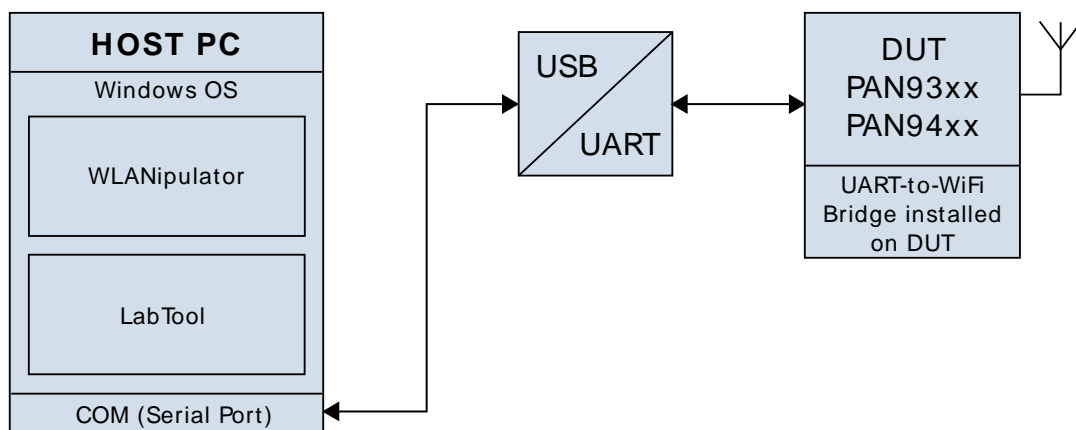The following requirements must be met to run the WLANipulator:

- ✓ Microsoft Windows 7 or higher[1]
- ✓ Microsoft .NET Framework 4[2]
- ✓ Functional Test Setup with Panasonic PAN9xxx DUT

3.2 Test Setup

Test Setup with PAN90xx

Test Setup with PAN93xx/94xx

[1] Tested with Microsoft Windows 7, 64bit.

[2] Tested with Microsoft .NET Framework version 4.0.30319.36365.

3.3 Installation

> ✏️ If you have a ZIP archive file with the LabTool and the WLANipulator bundle for a specific Panasonic module, you can skip the installation process. Simply unzip the archive to a preferred location on your hard disk.

Copy the WLANipulator ZIP archive into the installation directory of the LabTool. Unzip the archive without creating a directory.

The following files should now be located in the same directory as the LabTool executable file:

- IronPython.dll
- IronPython.Modules.dll
- Microsoft.Dynamic.dll
- Microsoft.Scripting.dll
- Microsoft.Scripting.Metadata.dll
- WLANipulator2.dll
- WLANipulator2.exe
- WLANipulator2.exe.config
- sendkey.exe
- sendkeys.exe

If you want to use predefined values for the target power of the module, you need one of the files listed in table ⇨ Optional Files for Target Power.

Ensure that the name of the executable LabTool file matches the correct name in the table ⇨ LabTool Executable Files.

The figure ⇨ Exemplary Setup depicts a complete installation of the WLANipulator and the LabTool for the PAN9020U. The directory looks similar for other Panasonic modules. Some files may differ.

LabTool Executable Files

Panasonic Module	LabTool-EXE
PAN9020U	DutApiBRIDGEETH8782U.exe
PAN9020S	DutApiBRIDGEETH8782S.exe
PAN9026	DutApiSisoBt.exe
PAN9055	DutApiMimoBtFmBrdigeUart.exe
	DutApiMimoBtFmBrdigeEth.exe
PAN9320	DutApiBridgeUART8782.exe
PAN9321	DutApiBridgeUART8782.exe
PAN9420	DutApiWiFiMW30XBrdigeUart.exe

Optional Files for Target Power

Panasonic Module	File With Target Power Values
Dummy	TxCal_PAN9xxx.ini
PAN9020U	TxCal_PAN9020.ini
PAN9020S	
PAN9026	TxCal_PAN9026.ini
PAN9055	TxCal_PAN9055.ini
PAN9320	TxCal_PAN9320.ini
PAN9321	TxCal_PAN9321.ini
PAN9420	TxCal_PAN9420.ini

Exemplary Setup

|		
DutApi8782DII_BRIDGE_ETH.dll	libfftw3-3.lib	TxCal_PAN9020.ini
DutApi8782DII_BRIDGE_ETH.lib	Microsoft.Dynamic.dll	w8782_2040_default.bin
DutApiBRIDGEETH8782U.exe	Microsoft.Scripting.dll	w8782_2040_default.sbin
FEM_RDUSB.ini	Microsoft.Scripting.Metadata.dll	WlanCalData_ext.conf
FF.hex	msvcr100d.dll	WLANipulator2.dll
IronPython.dll	sendkey.exe	WLANipulator2.exe
IronPython.Modules.dll	sendkeys.exe	WLANipulator2.exe.config
libfftw3-3.dll	SetUp.ini	

4 Use

4.1 Get Started

1. Double-click the WLANipulator2.exe.

   The program will run a batch file to check the program version of the LabTool to configure some version dependent settings.

   The WLANipulator main window opens. The window contains two tabs: For WLAN (left) and for Bluetooth (right). If the Panasonic module does not support Bluetooth, the **Bluetooth** tab will not be visible.
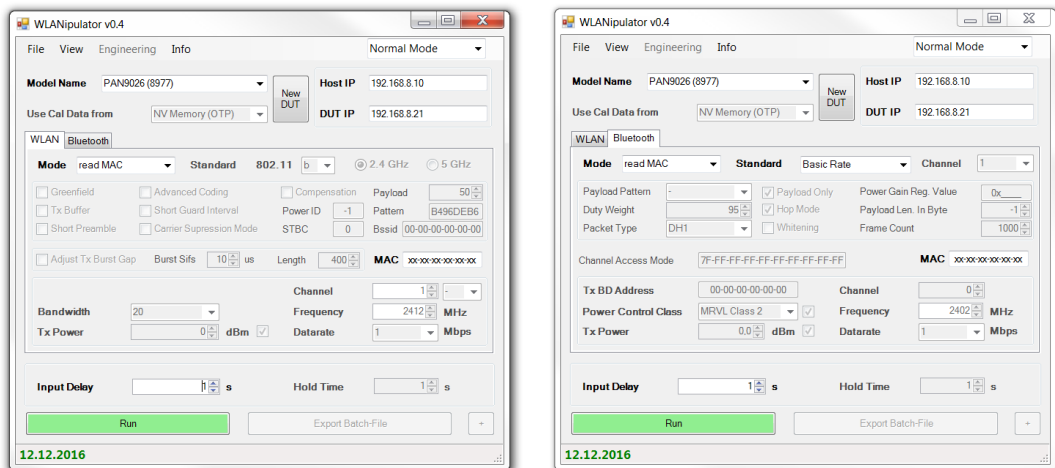
2. Select one of the operational modes: **Normal Mode**, **Certification Mode**, or **Batch Export Mode**.
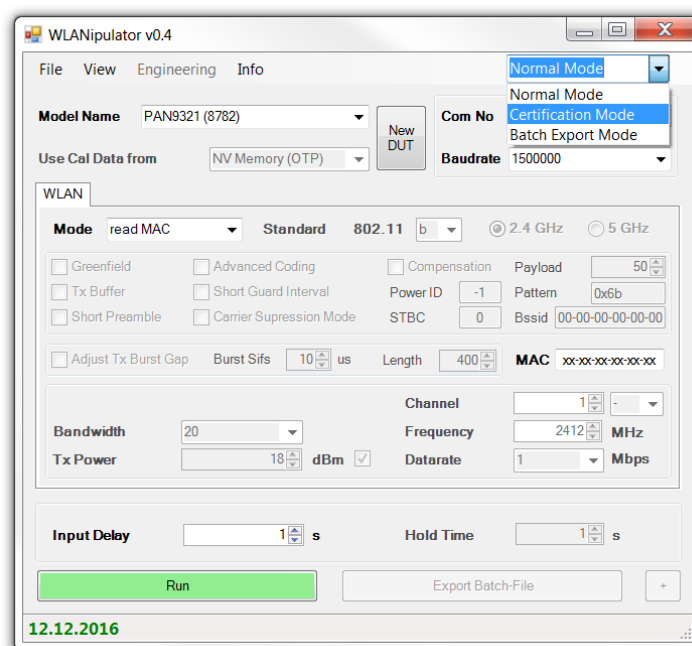
   The **Normal Mode** is used for engineering: It provides the most accessible settings.

The **Certification Mode** is used for certification purposes: All calibration data is read from the One Time Programmable (OTP) and most settings are fixed.

The **Batch File Mode** creates batch files (the LabTool is not started). The batch files can be used to run the LabTool with fixed settings.
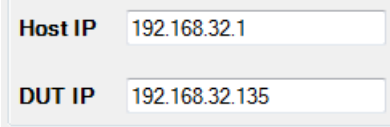
For additional information about the different modes see ⇨ 6 Operational Modes.

3. Select the appropriate model name and configure the communication settings:

a) **For PAN90xx**

DUT IP address and Host IP address from your test setup ⇨ Test Setup with PAN90xx

Example

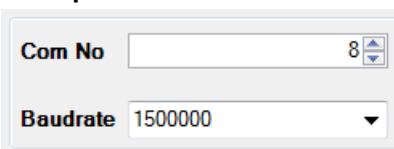| Host IP | 192.168.32.1 |
| DUT IP | 192.168.32.135 |

> The Host IP address is given by the HOST PC (MS Windows) running the WLANipulator and LabTool. The assigned IP address of the LAN connection or Virtual Network Adapter please find at [Control Panel] [Network and Sharing Center] [Local Area Connection] [Properties]. The DUT IP need to be assigned on the Bridge PC or Virtual Machine (Linux OS) and should be in the same address range and subnet (subnet mask 255.255.255.0) as the Host IP.
>
> A successful communication between WLANipulator / LabTool and DUT requires the installation of the Marvell® device specific Kernel drivers and a running Marvell® MFGbridge on the Linux system. The device specific Linux SW package and the MFGTool release are available at the Marvell® XtraNet. To register and get access to the Marvell® XtraNet please find contact ⇨ 9.1.1 Contact Us

b) **For PAN93xx / PAN94xx**

Serial Port number (**Com No**) and baud rate from your test setup ⇨ Test Setup with PAN93xx/94xx

Example

| Com No | 8 |
| Baudrate | 1500000 |

> The serial Port number (Com No) is given by the HOST PC if hardware of connected USB to UART converter is detected. The assigned **Com No** please find at [Control Panel] [Device Manager] [Ports (COM & LPT)]. For a successful communication use a baud rate of **1 500 000** baud and the assigned **Com No**.

The **readMAC** mode is selected by default.

4. Click the green **Run** button to read the MAC address from the memory of the module.

   The following warning is displayed:
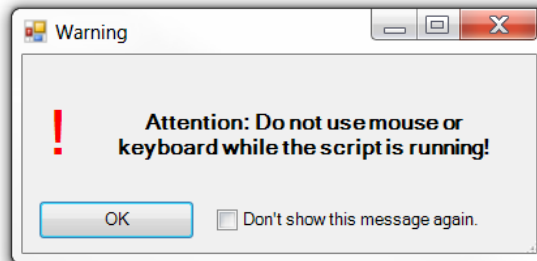
⚠️ The WLANipulator emulates the keyboard input to the LabTool. For that reason, it is very important that the LabTool does not lose the focus: Do not use the mouse or the keyboard.

At the same time, the color of the **Run** button changes to yellow and the text on the button changes to **Wait**. The status bar contains the message **Please wait...**
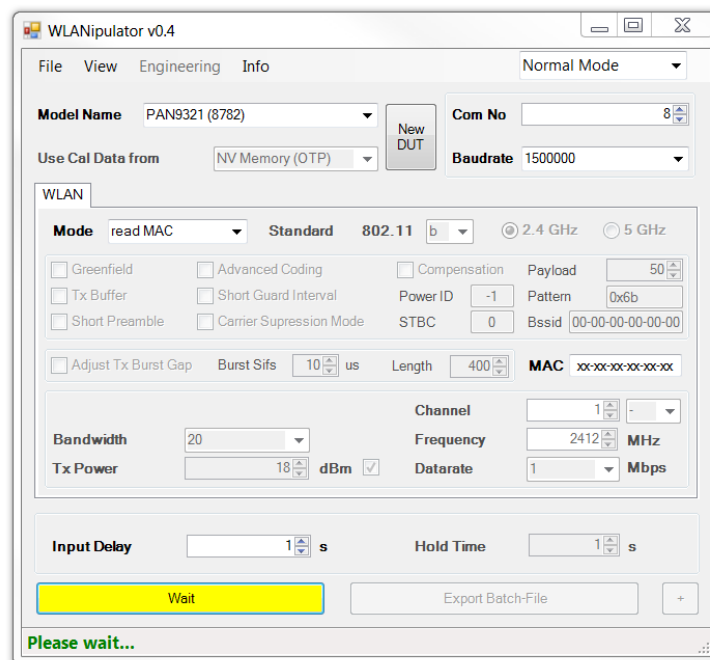
5. Click **OK** to confirm the warning.

   The WLANipulator reads the MAC address from the module and displays it. A valid MAC address enables additional modes to the **readMAC** mode.

   A warning is displayed with the instruction to reset the Device Under Test (DUT):
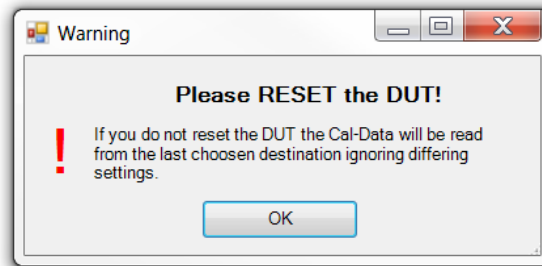
> **(i)** Changing the **Use Cal Data from** setting leads to the need to reset the module to ensure that the change will come into effect.

Now you can modify the WLAN or Bluetooth setting. If you change the mode, the standard, or the frequency band, some settings may be reset.

6. Click the green **Run** button to run the chosen settings.

7. Follow the description (4-5) above until the **Wait** button changes to red and the label to **Stop**. The settings are now applied to the DUT. The LabTool remains open until you click the red **Stop** button to stop the DUT.
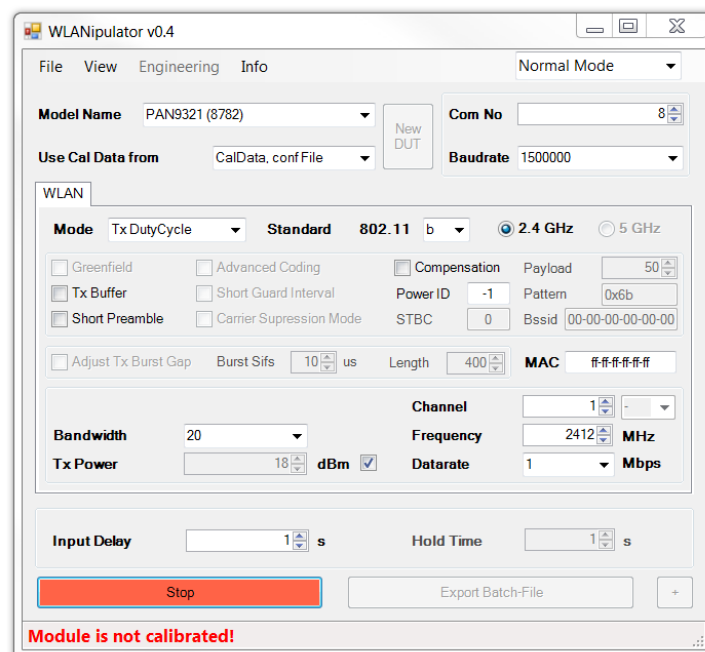
> **(i)** Do not close the LabTool manually. Always stop the LabTool using the WLANipulator.

4.2 Advanced Use

4.2.1 Change the DUT

1. Before changing the Device Under Test (DUT): Click **Stop** to stop the ongoing measurement.

2. Change the DUT.

3. Click **New DUT** to reset the WLANipulator with the initial software settings.

4. Click **Run** to read the MAC address of the new DUT.

4.2.2 The LabTool Log

The WLANipulator analyses the log file of the LabTool after the tool has been run. The status bar contains a message with the information, whether the run was successful. If the status bar does not contain the word **Success**, the last error message is displayed. The tooltip of the status bar contains all error messages.

Open the complete log

Double-click on the error message in the status bar or click **View > LabTool Log**.
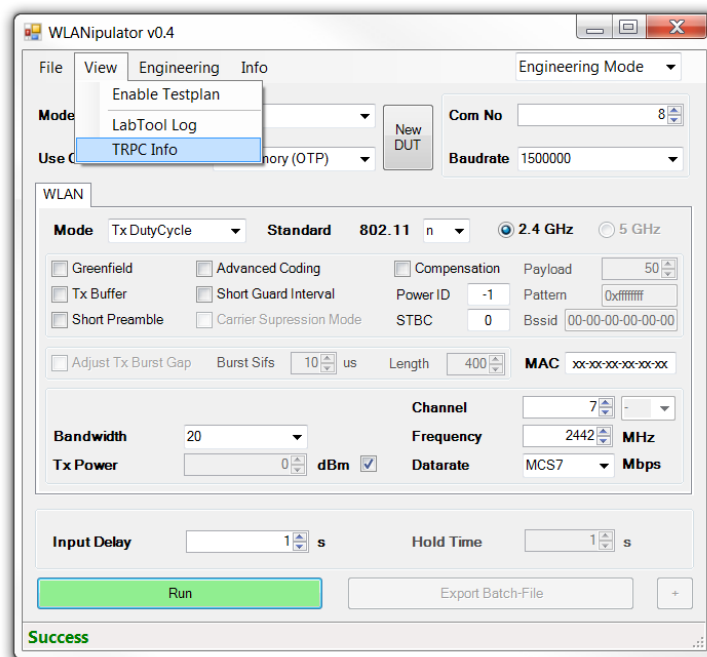
A new window opens:
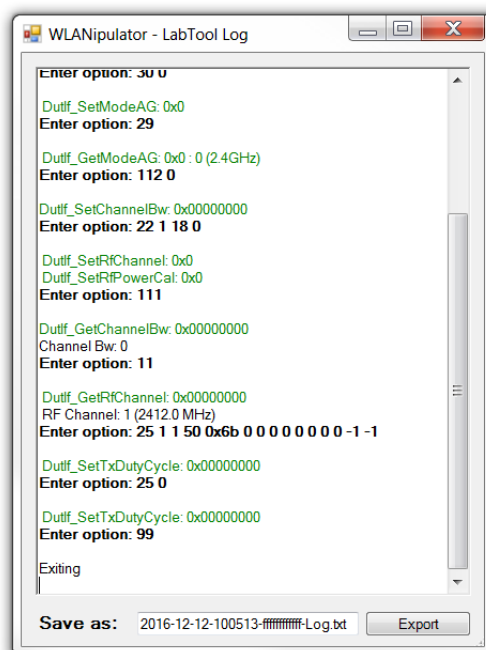
All status codes are highlighted in green, error codes in red. You can export the log into a text file (default) or a rich text format file.

Export the log into rich text format

1. Change the file extension in the text field from *.txt to *.rtf.
2. Click **Export** to save the log file in the current directory.
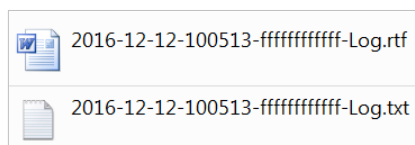
The log files are named with the date (YYYY-MM-DD), the time (hhmmss), and the MAC address xxxxxxxxxxxx as follows:

YYYY-MM-DD-hhmmss-xxxxxxxxxxxx-Log.txt

4.2.3   Save And Load Settings

The WLANipulator can save your settings on the hard disk drive and it can load them from there. To save the current settings into a csv file[3]: Click **File > Save**. To load settings from a file to the program: Click **File > Load**.

---

[3] Comma-separated values file with plain text.
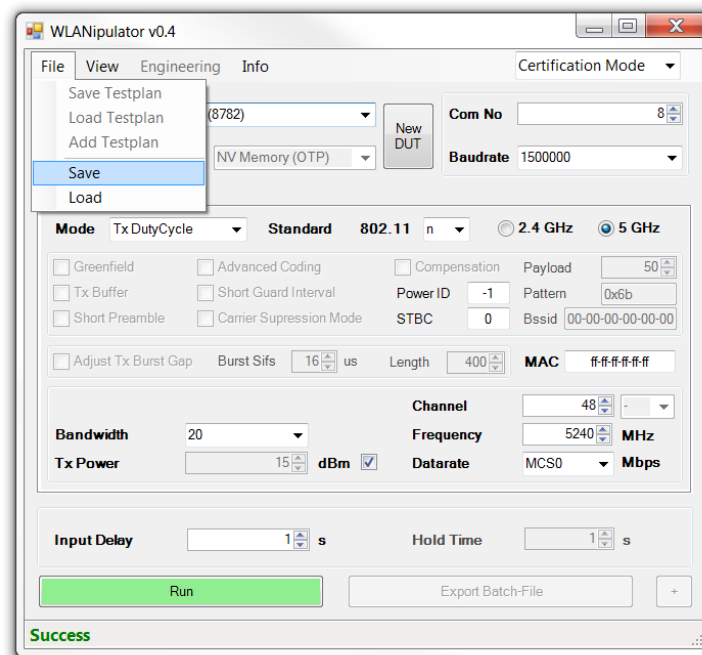
4.2.4 Transmitter Tests

Use the Tx DutyCycle, the Tx HighDutyCycle, the Tx Continuous or the Tx CW mode to test the Device Under Test (DUT) as a transmitter. For further information ⇒ 7.1 WLAN Modes.

1. Switch the WLAN mode to **Tx DutyCycle**, **Tx HighDutyCycle**, **Tx Continuous** or **Tx CW** mode.
2. Configure your settings.
3. Click **Run** to set the module in transmitter mode.

4.2.5 Receiver Tests

Use the Rx mode to test the Device Under Test (DUT) as a receiver. You need an external WLAN source as a transmitter.

1. Switch the WLAN mode to **Rx** mode.
2. Configure your settings.
3. Click **Run** to set the module in receiver mode and reset the counter.
4. Switch on your transmitter.
5. Wait until the transmission is finished.
6. Click **Stop** to stop the receiver mode and stop the counter.
7. The **Rx Packet**, **Multi Cast**, and **Error Count** values are displayed in the status bar.
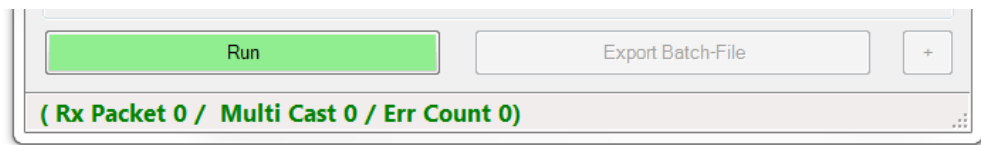
Alternatively, click **View > LabTool Log** to view the receive statistics in the LabTool Log.
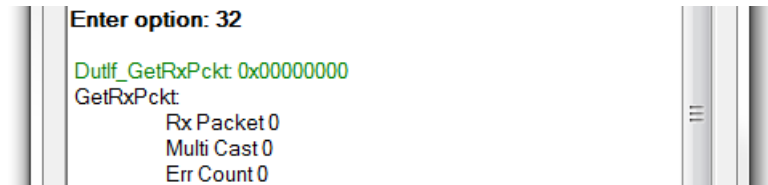
4.2.6 Export Batch Files

The WLANipulator can export the settings to batch files. These batch files can also control the LabTool.

1. Switch the operating mode to **Export Batch File** mode.
2. Configure your settings.
3. Click **Export Batch-File**.

A batch file with the file extension *.bat is written to the WLANipulator directory. The file name has the following convention:

Module Name	Mode	IEEE 802.11 Standard	Modulation	Data Rate	Channel	Frequency	File Extension
PAN9020U	TxDC	11b	DSSS	1Mbps	CH1	2412	.bat

➔ PAN9020U_TxDC_11b_DSSS_1Mbps_CH1_2412.bat

5 Settings

This section briefly describes the meaning of the various WLANipulator settings including the value ranges.

General Setting

Option	Description	Range
Model Name	Name of the Panasonic module	e.g. PAN9420
Use Cal Data from	Location of the calibration data: EEPROM, configuration file, non-volatile memory (OTP)	-
Host IP	Host IP network address	0.0.0.0 to 255.255.255.255
DUT IP	DUT IP network address	0.0.0.0 to 255.255.255.255
Com No	COM serial port number	Integer $1 \leq n \leq 65535$
Baud	Symbol rate of the COM port	-
Input Delay	Delay of the input of two commands?	Integer $0 \leq t \leq 5$
Hold Time	The time span in seconds in which the DUT stays active in the current mode	Integer $1 \leq t \leq 3\,600$

WLAN Settings

Option	Description	Value
Mode	Operating mode	-
Standard	WLAN standard defined in IEEE 802.11	-
Greenfield	An operational mode of the IEEE 802.11n standard (allow only 802.11n devices)	True/false
Tx Buffer	Transmit buffer	True/false
Short Preamble	IEEE 802.11b/n shorter preamble	True/false
Advanced Coding		True/false
Short Guard Interval	IEEE 802.11n supports shorter Guard Intervals	True/false
Carrier Suppression Mode	Suppress the carrier in the output signal	True/false
Compensation		True/false
Power ID	Let the Power ID be -1 to follow the bandwidth settings	Integer $-1 \leq t \leq 15$
STBC	Space Time Block Coding	Two bits 00 to 11
Payload		Integer $0 \leq t \leq 100$
Pattern	Pattern of the transmitted pseudo data	Hex value 00 to FF
Bssid	Basic Service Set Identifier	00.00.00.00.00.00 to FF.FF.FF.FF.FF.FF
Adjust Tx Burst Gap		True/False
Burst Sifs	Length of the Short Interframe Space in µs	Integer $0 \leq t \leq 255$
Length		Integer $1 \leq t \leq 400$
MAC	Media Access Control address	00.00.00.00.00.00 to FF.FF.FF.FF.FF.FF

Option	Description	Value
Tx/Rx Path	Which path is set: 0 or 1, or 0 and 1	'Path 0', 'Path 1', or 'Path 0 + 1'
Path	Path which settings are displayed by the GUI	0 or 1
Channel	Channel number of the 2.4 GHz or 5 GHz WLAN band	-
Offset	The channel number indicates whether the upper or lower part of the 40 MHz bandwidth channel is used	'-', 'up' or 'lo'
Bandwidth	Bandwidth in MHz	20 or 40
Frequency	Frequency in the 2.4 GHz or 5 GHz WLAN band in MHz	-
Tx Power	Target power at the output of the module in dBm	Integer $0 \leq p \leq 20$
Use target power from file	If checked: Use power values from file	True/false
Datarate	Transmit data rate in Mbps; depends on the IEEE 802.11n standard	-

6 Operational Modes

6.1 Normal Mode

The Normal Mode is the regular operational mode for the WLANipulator. It supports all necessary settings for customers.

Features

- All modes and standards

Restrictions

- Payload Weight is fixed (WLAN)
- Pattern is fixed (WLAN)
- Burst SIFS (Short Interframe Space) is fixed (WLAN)
- BSSID (Basic Service Set Identifier) is fixed (WLAN)
- Payload Length in Byte is fixed (Bluetooth)
- Channel Access Mode is fixed (Bluetooth)

6.2 Certification Mode

The Certification Mode is the recommended operational mode for certification purpose. It ensures that the right calibration data are used while testing.

Features

- Some defined settings for certification.

Restrictions

- Calibration Data are only read from the One Time Programmable (OTP).
- Payload Weight is fixed (WLAN)
- Pattern is fixed (WLAN)
- Burst SIFS (Short Interframe Space) is fixed (WLAN)
- BSSID (Basic Service Set Identifier) is fixed (WLAN)
- Payload Length in Byte is fixed (Bluetooth)
- Channel Access Mode is fixed (Bluetooth)

6.3 Batch Export Mode

The WLANipulator is able to export the settings to Batch files. These Batch files control the LabTool like the WLANipulator but with fixed settings. You can use the Batch files to repeat a measurement without using the WLANipulator.

For further description see ⇨ 4.2.6 Export Batch Files.

Features

- A connection to a DUT is not mandatory.
- A queue of settings is possible.

Restrictions

- The LabTool is disabled.

7 WLAN and Bluetooth Modes

> ℹ️ All WLAN and Bluetooth Tx and Rx modes used by the WLANipulator and LabTool are based on the **non-signaling** condition.

7.1 WLAN Modes

7.1.1 readMAC

In this mode the WLANipulator reads the Media Access Control (MAC) address from the DUT. The MAC address is verified by the WLANipulator.

> ⚠️ An invalid or empty MAC address will cause an abnormal termination of the WLANipulator ⇨ 8 Troubleshooting.

7.1.2 Tx DutyCycle

The standard transmit mode for WLAN. It supports the IEEE 802.11 standards a/b/g/n.

> ℹ️ This mode for WLAN is deprecated for PAN9xxx modules using Marvell chipset generation 88W87xx. Use the Tx HighDutyCycle instead ⇨ 7.1.3 Tx HighDutyCycle.

7.1.3 Tx HighDutyCycle

This mode is the further development of the Tx DutyCycle mode. It supports the IEEE 802.11 standards a/b/g/n.

7.1.4 Tx Continuous

Transmission of a continuous modulated WLAN signal.

7.1.5 Tx CW

Transmission of an unmodulated continuous wave signal.

> ⚠️ Some modules may overheat if operated in this mode for a longer duration.

7.1.6 Rx

The module receives WLAN data from a transmitting source. The **Start** button resets the counter for received packets. The module receives data packets until the operating is stopped by clicking the **Stop** button. The Rx Packet, Multi Cast, and Error Count values will be displayed in the status bar at the bottom of the WLANipulator. Alternatively, they can be viewed in the LabTool log.

For a detailed description ⇨ 4.2.5 Receiver Tests.

7.2 Bluetooth Modes

The description of the Bluetooth modes will be added in the next version of this document.

8 Troubleshooting

The WLANipulator crashes on start-up and produces one of the following messages in the Log.txt file:

- **No module found.**
  Please make sure that your module is supported by the actual version of the WLANipulator.
  If your PAN9xxx is supported, ⇨ 9.1.1 Contact Us.

The WLANipulator crashes and produces one of the following messages in the Log.txt file:

- **0x4D6143FF**
  Open the Test.txt file in the LabTool and WLANipulator directory. If the content is not readable: Delete, rename, or move the Test.txt file and retry the measurement.

  Please email us, if the problem persists ⇨ 9.1.1 Contact Us.

The shell displays the message: "The command "sendkey.exe" […] can not be found." or "Der Befehl "sendkey.exe" ist entweder falsch geschrieben oder konnte nicht gefunden werden."

Verify that the sendkey.exe is located in the LabTool directory.

The shell displays the message: "The command "sendkeys.exe" […] can not be found." or "Der Befehl "sendkeys.exe" ist entweder falsch geschrieben oder konnte nicht gefunden werden."

Verify that the sendkeys.exe is located in the LabTool directory.

The LabTool produces errors because of incomplete or mixed up commands.

The LabTool is not fast enough to process the commands sent by the WLANipulator. Try to increase the input delay in the WLANipulator. The connected module needs to be reset.

The model name of your module is not selectable.

Not all variants of the modules are listed separately. Check if the antenna version of your module is selectable, for example: PAN9010U > PAN9020U or PAN9045 > PAN9055.

The settings for DUT IP address, HOST IP address, Com Port number and Baud rate are not restored from the SetUp.ini.

Check if all of the following files are located in the LabTool directory: SetUp.ini and/or SetUp.ini.old.

The 'Use Cal Data from' setting is not taken into account by the DUT.

Reset the DUT after each change of this option.

The target power values cannot be read from the TxCal_PAN9xxx.ini.

Verify that the checkbox next to the target power is checked and that the correct INI-file (e.g. TxCal_PAN9026.ini) is located in the current directory.

The program does not create a batch file in Batch Export Mode.

The program is not able to keep old files with the same file name. The old file will be replaced.

The program crashes when loading a "save" file.

The file may be corrupted. Save a new file and compare it with the damaged file regarding item count etc. The "save" files contain comma-separated values (CSV).

9 Appendix

Supported Devices and Variants

Brand Name	Description	DUT Interface
PAN9020U	WLAN Radio Module	USB
PAN9020S	WLAN Radio Module	SDIO
PAN9026	WLAN & Bluetooth Radio Module	SDIO
PAN9055	WLAN & Bluetooth Radio Module	USB/SDIO
PAN9320	WLAN Fully Embedded Module	UART0
PAN9321	WLAN Fully Embedded Module	UART0
PAN9420	WLAN Fully Embedded Module	UART0

For further information please refer to our product documentation ⇨ 9.1.2 Product Information.

9.1 Contact Details

9.1.1 Contact Us

Please contact your local Panasonic Sales office for details on additional product options and services:

For Panasonic Sales assistance in the **EU**, visit

https://eu.industrial.panasonic.com/about-us/contact-us

Email: wireless@eu.panasonic.com

For Panasonic Sales assistance in **North America**, visit the Panasonic Sales & Support Tool to find assistance near you at

https://na.industrial.panasonic.com/distributors

Please visit the **Panasonic Wireless Technical Forum** to submit a question at

https://forum.na.industrial.panasonic.com

9.1.2 Product Information

Please refer to the Panasonic Wireless Connectivity website for further information on our products and related documents:

For complete Panasonic product details in the **EU**, visit

http://pideu.panasonic.de/products/wireless-modules.html

For complete Panasonic product details in **North America**, visit

http://www.panasonic.com/rfmodules