

PAN9420

Quick Start Guide

Rev. 1.1



By purchasing 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 Industrial Devices Europe GmbH (Panasonic) reserves the right to make changes as required at any time without notification.

© Panasonic Industrial Devices Europe GmbH 2018.

All rights reserved.

This Quick Start Guide does not neither implicit nor explicit claim to be complete and free of mistakes.

The information contained herein is presented only as guidance for this Product use. No responsibility, implicit or explicit 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 this 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 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 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 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.....	4
1.1	Purpose and Audience	4
1.2	Revision History.....	4
1.3	Use of Symbols	4
1.4	Related Documents	5
2	Introduction	6
2.1	What is in the Box.....	6
2.2	Additional Equipment.....	8
3	PAN9420 Overview	9
3.1	Features	9
3.2	Interacting with the Evaluation Kit.....	9
3.3	Powering the Evaluation Kit.....	10
4	First Time Set Up	13
4.1	Powering.....	13
4.2	Connecting the Evaluation Kit.....	14
5	Navigating the PAN9420 Web Server	20
5.1	Web Server Default Homepage	20
5.2	Web-App Page	21
6	Further Information.....	23
6.1	Contact Us.....	23
6.2	Product Information	23

1 About This Document

1.1 Purpose and Audience

The purpose of this document is to allow new users to promptly orient themselves with the PAN9420 Evaluation Kit, as well as speedily being able to start evaluating and using it.




In this document the PAN9420 Wi-Fi module is synonymously referred to as “PAN9420” or “the module”.

The document is intended for design engineers and application engineers who plan to integrate the PAN9420 into their product. It is generally useful for anyone wanting to understand the setup of the Evaluation Kit.

1.2 Revision History

Revision	Date	Modifications/Remarks
1.0	2018-06-15	Initial version
1.1	2018-09-20	Formal and structure changes

1.3 Use of Symbols

Symbol	Description
	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 software.
⇒ [chapter number] [chapter title]	Cross reference Indicates cross references within the document. Example: Description of the symbols used in this document ⇒ 1.3 Use of Symbols .
✓	Requirement Indicates a requirement that must be met before the corresponding tasks can be completed.
→	Result Indicates the result of a task or the result of a series of tasks.
This font	GUI text Indicates fixed terms and text of the graphical user interface. Example: Click Save .

Symbol	Description
Menu > Menu item	Path Indicates a path, e.g. to access a dialog. Example: In the menu, select File > Setup page .
This font	File names, messages, user input Indicates file names or messages and information displayed on the screen or to be selected or entered by the user. Examples: <code>pan1760.c</code> contains the actual module initialization. The message <code>Failed to save your data</code> is displayed. Enter the value <code>Product 123</code> .
[Key]	Key Indicates a key on the keyboard, e.g. [F10] .

1.4 Related Documents

Please refer to the Panasonic website for related documents ⇒ [6.2 Product Information](#).

2 Introduction

2.1 What is in the Box

The PAN9420 Evaluation Kit comes with the following three components:

- Mother Board (MB)
- PAN9420ETU (easy-to-use) – mounted on the MB
- USB Type-B cable

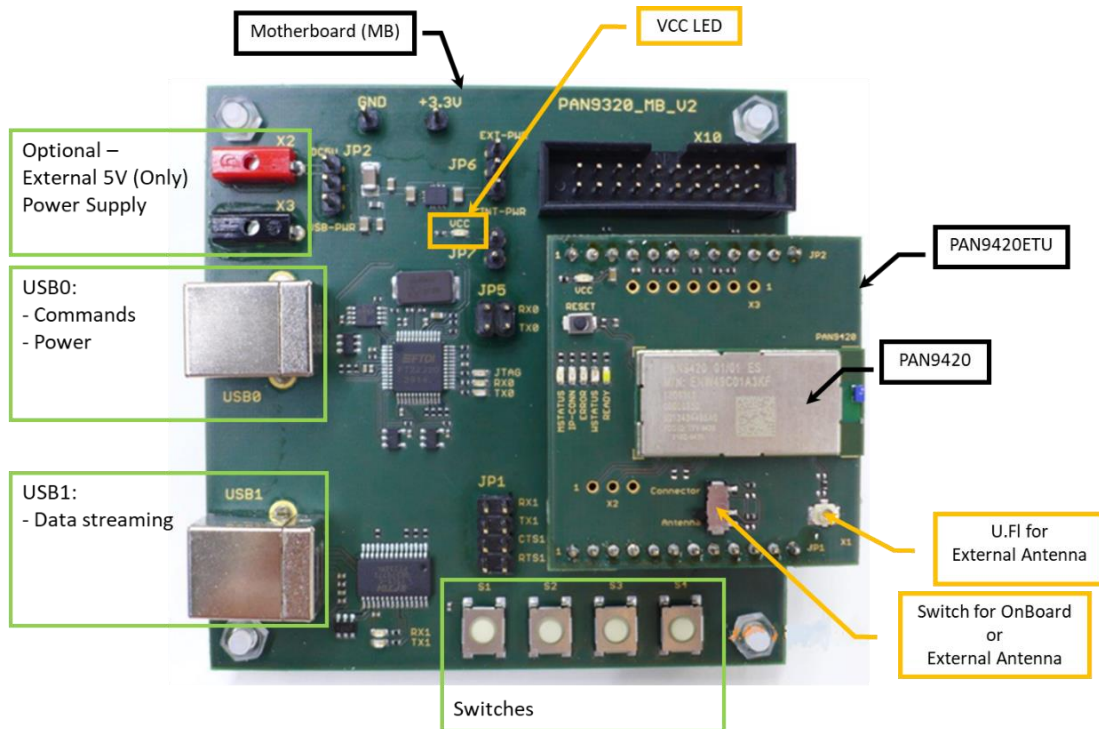


For any further supportive documentation, please use the QR Code on the box or please refer to the link in [⇒ 6.2 Product Information](#).

2.1.1 The Mother Board (MB)

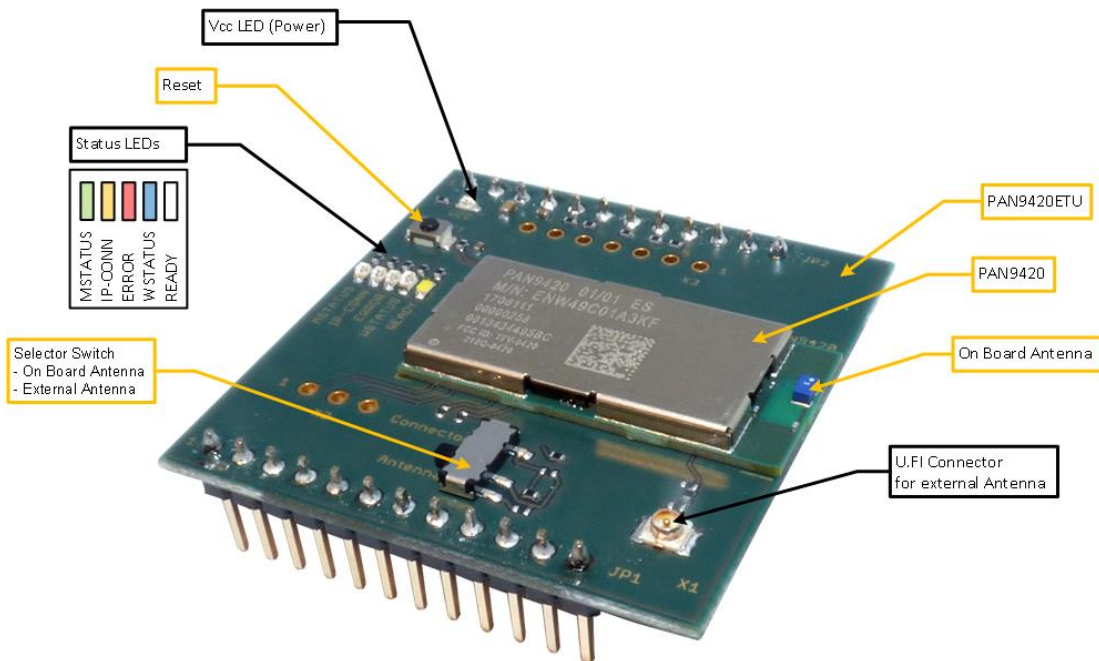
The MB consists of the following features and parts:

- **USB Type-B receptacles**
 - USB0: Provides 5 V power via USB and the command UART0
 - USB1: Data UART1 (e. g. Netcat, Webcat, UDP)
- **Jumpers**
 - JP2, JP6 and JP7, Set power source
 - JP5 UART0 (RX and TX)
 - JP1 UART1 (RX, TX, CTS and RTS)
- **Switches**
 - S1: Factory Reset (if held for 10 seconds will invoke)
 - S2: Not Connected
 - S3: WAKE_UP0
 - S4: WAKE_UP1
- **Optional External 5 V power supply via X2 and X3**



2.1.2 The PAN9420 ETU

The PAN9420ETU is a daughter board with the module mounted on it. It offers access to: GPIOs, LEDs, U.FI connector (for external antenna) and an Antenna Selector Switch.



The ETU comes pre-mounted on the motherboard and can be swapped with other daughter boards. You can order the ETU by itself.

2.1.3 USB Type-B Cable

The USB Type-B cable is provided to connect the Evaluation Kit to your PC or Laptop. The cable is used for data transfer as well as providing the Evaluation Kit with 5 V DC, which can be sourced from your PC or alternatively from an external power source such as a portable power bank.

2.2 Additional Equipment

To interact with the PAN9420 Evaluation Kit, you will also need:

- ✓ Desktop or Laptop (PC) with a USB port, and the following software tools:
- ✓ Browser such as: Chrome, Firefox
- ✓ Terminal such as: PuTTY, TeraTerm, HTerm
- ✓ Panasonic's WIFigurator – An integrated SW tool for the PAN9420 Evaluation Kit.

Alternatively, you can use a smart device such as a smartphone or a tablet.



Using a smart device will limit you to an OTA (Over The Air) wireless connectivity as described in [⇒ 3.2.2 Wireless](#).

For the most comprehensive evaluation capabilities, you will need to use a PC.

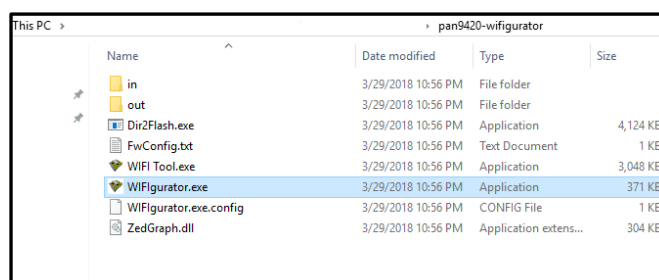
2.2.1 The WIFigurator

The WIFigurator is a handy evaluation tool for Windows OS only, provided by Panasonic. To use the WIFigurator, please follow the next steps:

1. Download the ZIP file from the download section.

Please refer to the Panasonic website for further information [⇒ 6.2 Product Information](#).

2. Extract the ZIP file.
3. Run the WIFigurator.exe from the extracted directory.



How to use the WIFigurator tool will be explained later in the document [⇒ 4.2.2 Wired – Connecting through USB0 and the WIFigurator](#).

3 PAN9420 Overview

3.1 Features

The PAN9420 is an all-inclusive, embedded Wi-Fi module. It contains an integrated IoT-ready web-stack that offers and provides many key IoT features.

For detailed and up-to-date list and description of all available features, please read the [PAN9420 Communication Specification](#) available in the download section on our website.

Please refer to the Panasonic website for related documents ⇒ [6.2 Product Information](#).

3.2 Interacting with the Evaluation Kit

The PAN9420 Evaluation Kit is an evaluation and design platform for the PAN9420 module. There are two optional methods to interact with the PAN9420 using the Evaluation Kit: wired and wireless.

3.2.1 Wired

This method uses the provided USB ports with USB0 for commands and USB1 for data. Using this scheme, you will also need to use the terminal program and the WIFIfurigator. You will be able to:

- Interact with the various SW modules provided by the integrated stack
 - Issue commands
 - Receive acknowledgment (and error codes)
- Stream data
- Upload new:
 - Web server content
 - Server and Client certificates
 - Client private keys
 - Configuration files

3.2.2 Wireless

This method is using the Wi-Fi connection and allows the user to access the web server, and interact with its content. You can still interact with the stack, given that the web server provides a command interface to the stack.



Please note that the two methods are distinct, and complementary to each other, yet, they share some limited overlapped functionality.

3.3 Powering the Evaluation Kit

3.3.1 General

To power up the Evaluation Kit, please choose between the following two methods:

External Power

Use X2 and X3 to provide 5 V power from an external source. An external source can be a battery or a power supply. This method allows users to perform some power measurements.



The power provided to the board must be 5 V DC.

USB Connection

1. Connect the MB's USB0 Port to your computer's USB-Port.

Alternatively, a portable power-bank which provides 5 V can be used to power up the Evaluation Kit.



It is recommended to use the USB0 to power up the Evaluation-Kit.



On the PAN9420 Evaluation Kit:

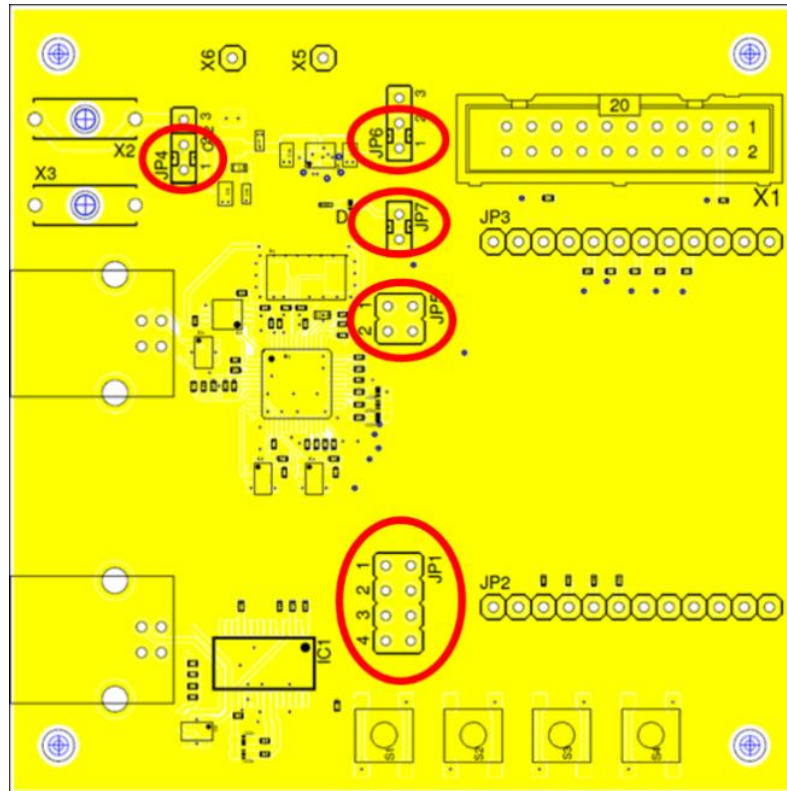
- USB0 is connected to the PAN9420's UART0.
UART0 is primarily utilized to send commands to, and receive acknowledgments between the PAN9420 and the host.
- USB1 is connected to the PAN9420's UART1.
UART1 is employed by the following SW Modules to stream data:
 - Netcat
 - Webcat
 - UDP
 - HTTP client
 - MQTT client
 - Firmware update
 - CMD to BIN UART tunneling

3.3.2 Proper Jumpers Setup



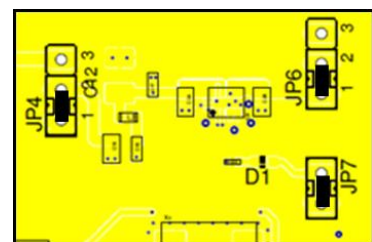
Prior to applying power to the Evaluation Kit, please make sure that all the jumpers on the Motherboard are set properly.

In the picture below (circled in red) are all related jumpers.



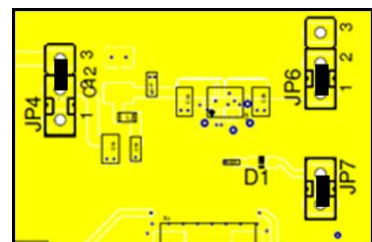
Powering Evaluation Kit using USB0:

- JP¹** Pin 1 connected to Pin 2
- JP6** Pin 1 connected to Pin 2
- JP7** connected



Powering Evaluation Kit using X2 and X3:

- JP¹** Pin 2 connected to Pin 3
- JP6** Pin 1 connected to Pin 2
- JP7** connected



¹ See picture in the upper left corner.

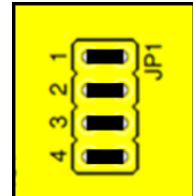
UART0 Jumpers:

JP5 Pin 1 connected across
Pin 2 connected across



UART1 Jumpers:

JP1 Pin 1 connected across
Pin 2 connected across
Pin 3 connected across
Pin 4 connected across



4 First Time Set Up

4.1 Powering

As mentioned above, to connect to and communicate with the Evaluation Kit and the PAN9420, you will need a PC with your choice of OS.

The following tools must be installed:

- ✓ Browser
- ✓ Terminal program to send and receive datagrams
- ✓ Alternatively, or additionally to the terminal you will need the WIFligrator

1. Choose your preferred powering method above ⇒ [3.3 Powering the Evaluation Kit](#).

➔ Once power is applied, the Evaluation Kit will power on and go through initialization. The boot and initialization takes a few seconds.

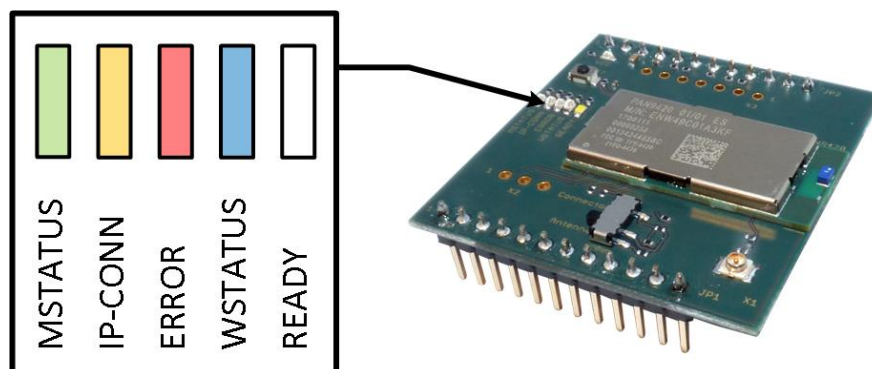
➔ The subsequent LEDs on the ETU will light up as follows:

VCC	Constantly on
READY	Constantly on
MSTATUS	Blinking



WSTATUS might be blinking periodically, which indicates the modules scanning process.

Please see below illustration of the LED position:



4.2 Connecting the Evaluation Kit

As mentioned above in ⇒ 3.2 [Interacting with the Evaluation Kit](#) there are two optional methods to connect and interact with the PAN9420, please choose your preferred method, and use the following to interact with the PAN9420.

4.2.1 Wired – Connecting through USB0 and a Terminal Program

Simply connect the provided USB Type-B cable to USB0 of the MB and to a port in your computer.



In the very first time connecting the USB0 of the MB to your PC, and given that the FTDI driver is not pre-installed on your machine, you will be asked to install the FTDI drivers.

The following prerequisites must be met:

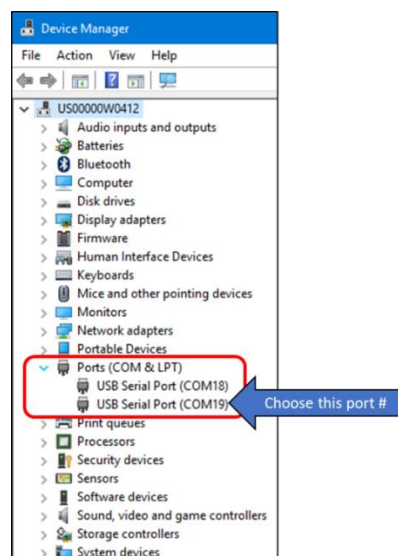
✓ FTDI driver is installed

1. Connect the Evaluation Kit to your PC.

➔ In **device manager > ports** you will see two COM ports: One is for JTAG-via-USB and the other one is connected to PAN9420's UART0.

2. Choose the correct **COM Port**.

Generally, the port with the highest number of the two corresponds is the connected one to PAN9420's UART0. In the example below, you will use COM19.



To test the Command Interface via USB0 you could use any terminal program, Panasonic's terminal program of choice is HTerm.

Default configuration for UART0 and UART1:

- Baud rate: 115 200
- Data bits: 8
- Parity bit: none
- Stop bits: 1



UART0 does not utilize any flow control.

UART1 utilizes HW flow control (RTS/CTS). To achieve maximal throughput, flow control for UART1 is required.

Check whether the correct COM Port is connected

1. Send the command `get system firmware` using your terminal program of choice, to request the firmware version of the module.



A command must be followed by CR (Carriage Return) and LF (Line Feed) as described in the communication specification. You can set your terminal to issue them automatically.

You might also need to set the terminal's echo.



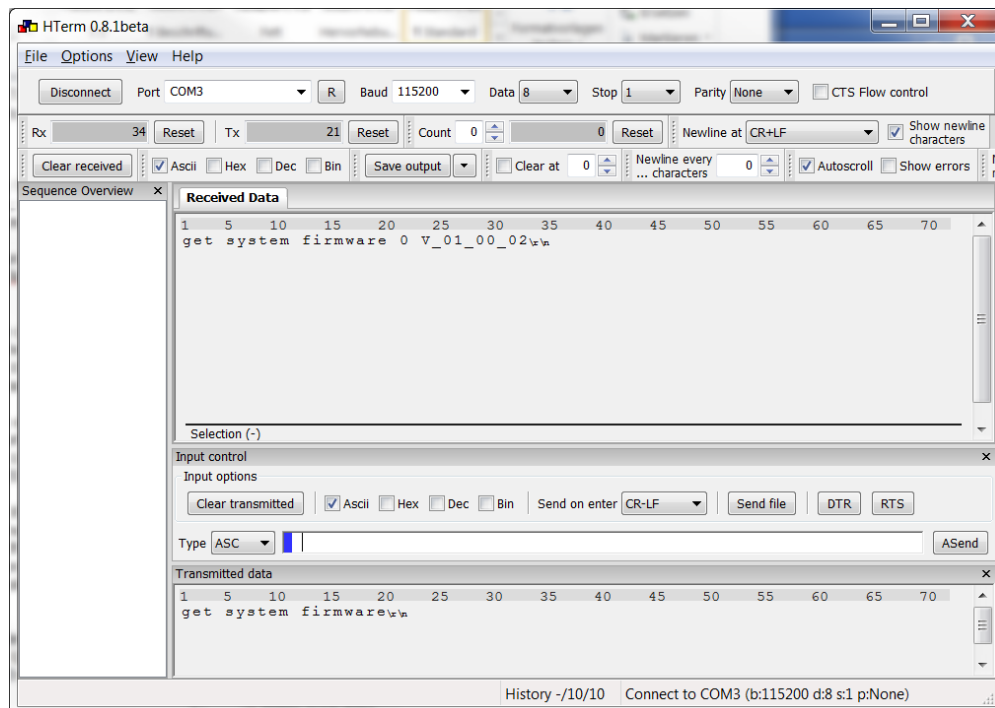
If you are new to HTerm, please do not use the button **ASend**. To invoke a command in Hterm:

1. Type it in.
2. Press `Enter`.



Type the command here
Use ENTER

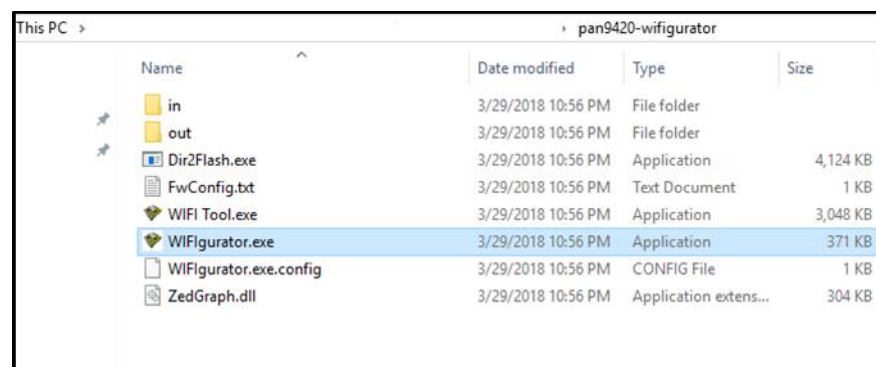
- The response from the PAN9420 should be received like in the received window of the HTerm-based example below:



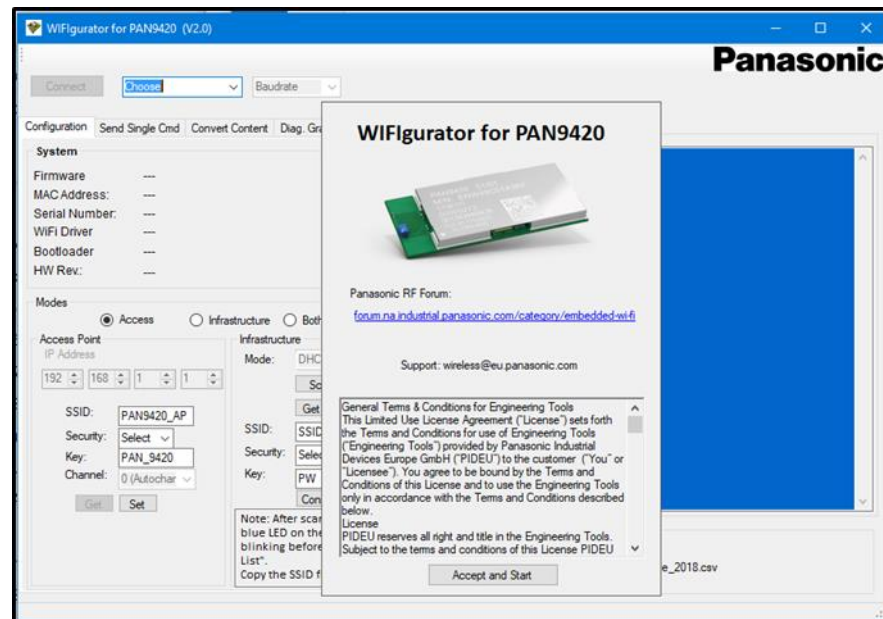
4.2.2 Wired – Connecting through USB0 and the WIFigurator

An alternative to using a terminal program is using the WIFigurator provided by Panasonic. The WIFigurator incorporates terminal like capabilities, along with an easy-to-use GUI.

1. Connect the MB's USB0 to your PC's USB port using the provided USB Type-B cable → [4.2.1 Wired – Connecting through USB0 and a Terminal Program](#).
2. Double-click the executable `WIFigurator.exe` from the WIFigurator's directory → [2.2 Additional Equipment](#).



→ You will see the WIFigurator's GUI along with the welcome-page.

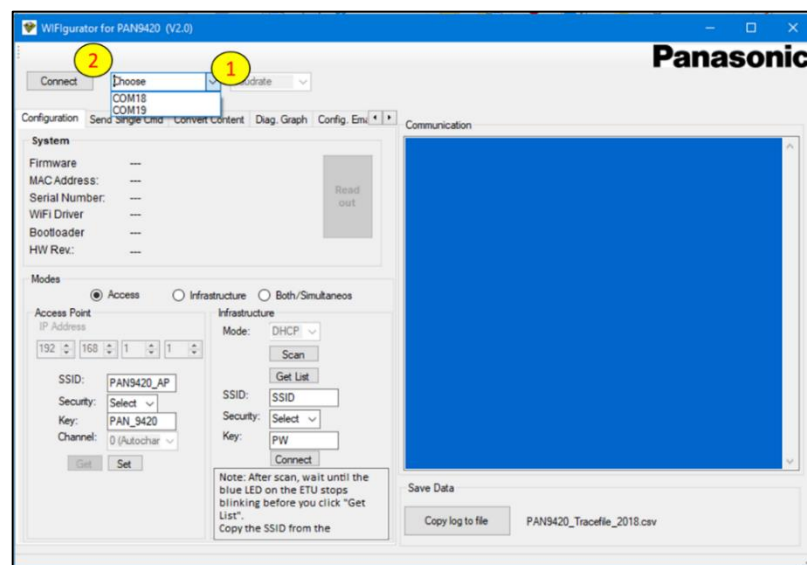


Start the program:

1. Read the general terms and conditions.
2. Click **Accept and Start**.

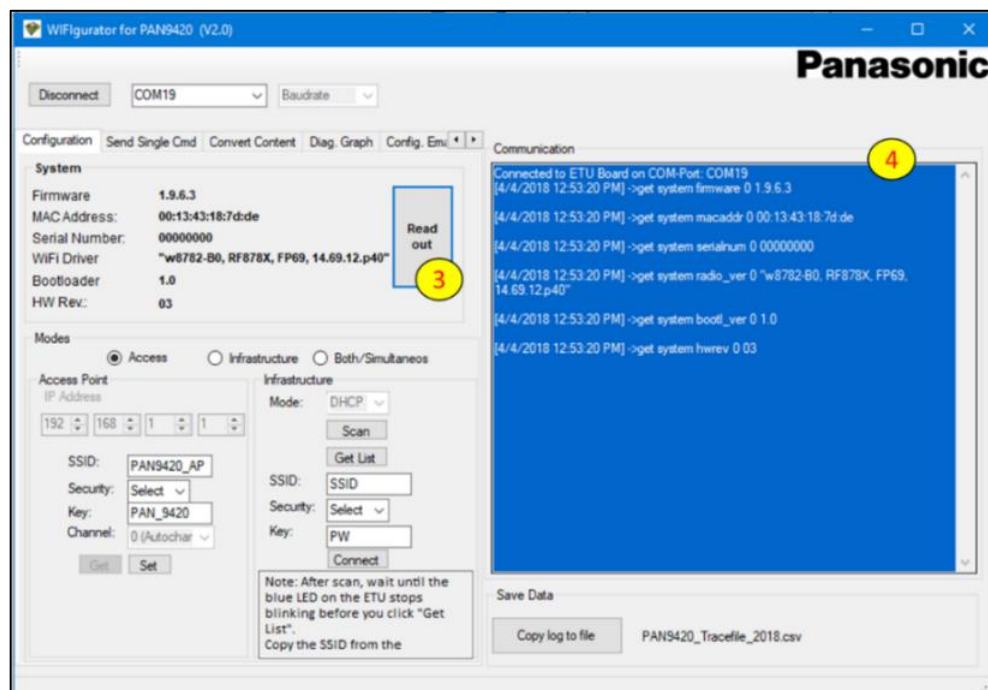
Read out the modules firmware, MAC address, serial number, radio version, bootloader version and hardware revision:

3. On the top, choose the corresponding COM port (1).
It is the same as used in ⇒ 4.2.1 Wired – Connecting through USB0 and a Terminal Program.
4. Click **Connect** (2).



5. Click **Read Out** (3).

➔ You should see a response in the **Communication** part of the GUI (4):



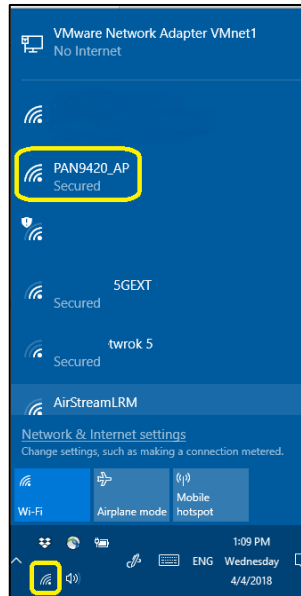
Using the WIFigurator you will be able to

- Issue commands and see the response
- Easily and using the GUI, set major key features
- Convert your HTML code to a firmware update file (.fwu)
- Load the firmware onto the module

4.2.3 Wireless – Connecting through Wi-Fi

1. Apply power to the Evaluation Kit ➔ [3.3 Powering the Evaluation Kit](#).
2. Activate the **WLAN Network Manager** on your PC or smart device. In Windows based machines, it is mostly on the bottom right corner of the screen.
 - ➔ Your device will scan for new wireless access points (APs):

3. Connect to **PAN9420_AP** to connect.



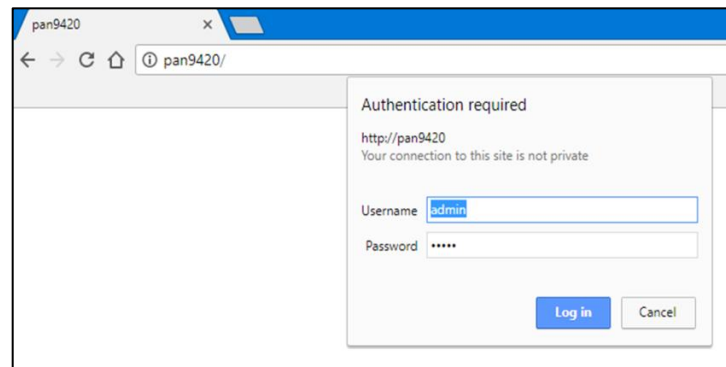
4. The standard connection is protected with a WPA2 key. Enter the password `PAN_9420`.

When the connection is established:

1. Open a browser.
2. Enter the default IP address of the PAN9420 in the URL line: `192.168.1.1`
As the PAN9420 supports mDNS, you could alternatively use `pan9420.local` or `pan9420` in the URL line instead of the IP address.
Please note that some browsers support this feature, and some do not.

The PAN9420's web server will prompt you for authentication, depending on your browser, you will see a pop-up **Authentication required**.

3. Enter the username `admin` and password `admin`.
4. Click **Log in**.



5 Navigating the PAN9420 Web Server

While using Wi-Fi connectivity, and once authenticated and connected to the web server, you are accessing and browsing the web server's HTML and related resources.

The web server is a SW module, and it is provided as part of the PAN9420's stack. The PAN9420 modules that are provided with the ETU also include Panasonic's default web pages. Standard PAN9420 modules are supplied with no additional code. The default web server content which is provided with the PAN9420 ETU allows the user to experience some of the capabilities of the web server. Among them:

- Configuring the AP and STA parameters,
- Scan for APs,
- Get some training via the provided tutorials.

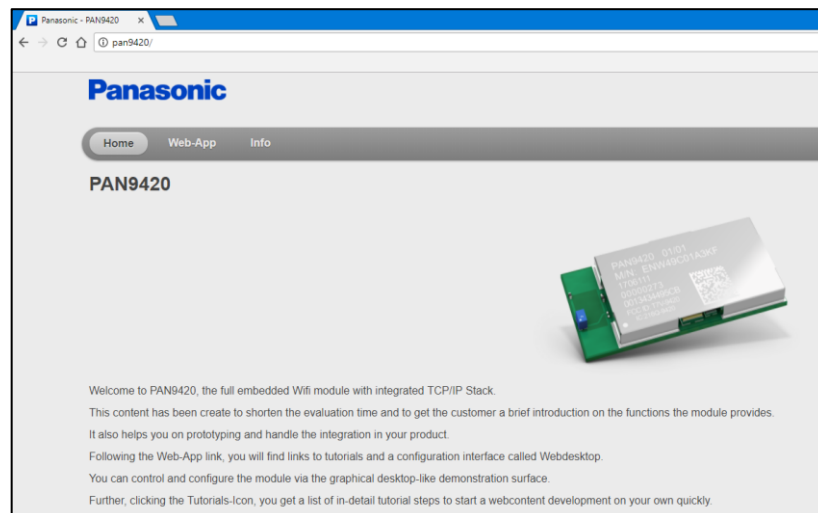
You are encouraged to navigate through web pages, please see below for some of the optional web pages.



Users can utilize up to 2 MB of the internal flash memory for the hosted web server content, custom configuration files, certificates and keys.

5.1 Web Server Default Homepage

After providing the web server's IP address, or by using the mDNS name, the very first page is the welcome- or homepage.



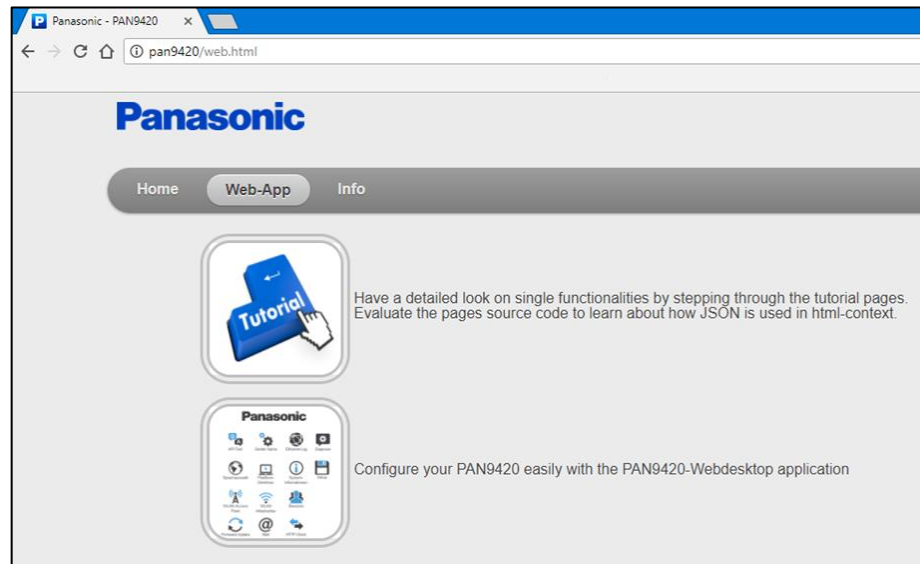
You have three tabs to choose from:

- **Home:** Will bring you back to the homepage.
- **Web-App:** Will allow you to choose from two options: **Tutorials** and **Webdesktop**
- **Info:** Provide info about the provider of the content.

5.2 Web-App Page

The Web-App page allows you to choose between the on-module tutorials and the Webdesktop. Again, all of which are hosted on the PAN9420.

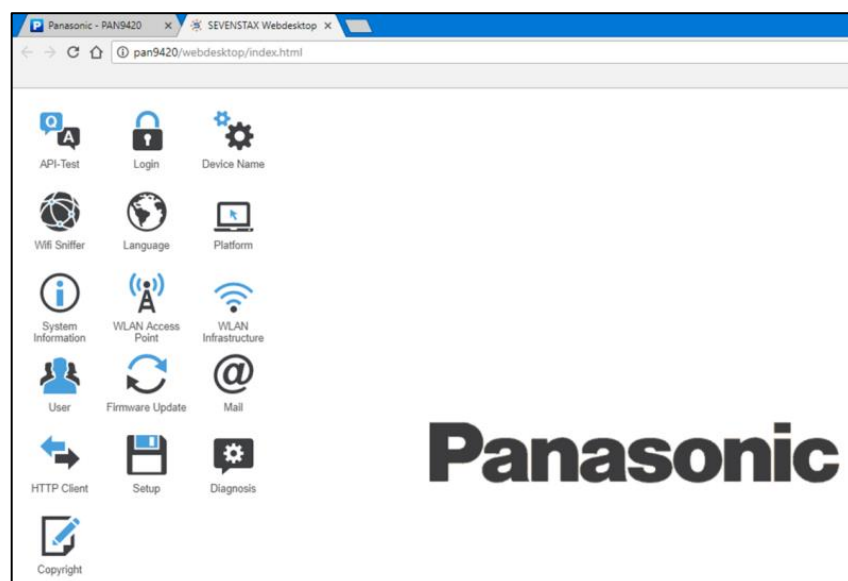
By clicking on one of the icons, you will be taken to the corresponding landing page.



5.2.1 Webdesktop Page

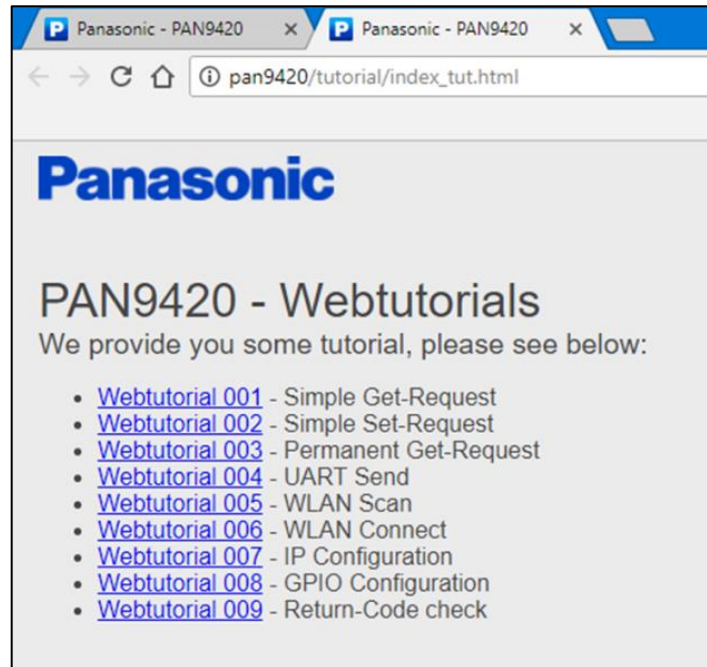
The Webdesktop is an example for a landing page that allows the designer to provide the end-user with an easy web based UI (User Interface). By combining HTML and JSON, information can be retrieved in real time, rendered and streamed to the user's browser.

A similar Webdesktop can be designed to manage and configure various features while streaming information.



5.2.2 Tutorial Page

The tutorial page provides a collection of simple to follow tutorials. Each designed to demonstrate a different feature or SW Modules of the stack.



For a more detailed information on how to create your own web content using JSON, you could access the development tutorials flashed on the module, as depicted above.

6 Further Information

6.1 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” website 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>

6.2 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>