Panasonic

PAN9026

Wi-Fi Dual Band 2.4/5 GHz and Bluetooth Module

Quick Start Guide

Rev. 1.0

Wireless Modules

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Table of Contents

1 About This Document

1.1 Purpose and Audience

This Quick Start Guide explains how to setup the PAN9026-IMX which consists of a Wandboard Dual (WB-IMX6U-BW) and the PAN9026-MSD.

It describes the basic usage modes and gives an introduction to the software that is provided.

The document is intended for software engineers.

1.2 Revision History

Revision	Date	Modifications/Remarks
1.0	31.05.2018	Initial version

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 module.
⇨ [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:** `pan1760.c` contains the actual module initialization. The message `Failed to save your data` is displayed. Enter the value `Product 123`.
[Key]	**Key** Indicates a key on the keyboard, e.g. **[F10]**.

1.4 Related Documents

Please refer to the Panasonic website for more information as well as related documents
⇨ 7.2 Product Information.

Overview

The PAN9026-IMX is a development platform for the Wi-Fi/BT PAN9026 module.

The PAN9026 module requires a fairly powerful host processor that executes both the low-level Wi-Fi driver as well as some high-level Wi-Fi application software.

Because of this, the Wandboard was chosen as the hardware platform. It is based on the well-known and powerful NXP i.MX6 processor and provides a separate µSD card slot for attaching peripheral devices like the PAN9026-MSD.

A Linux-based installation was chosen as the software platform. The Linux kernel provides an established environment for running a Wi-Fi driver and the available Wi-Fi applications make it possible to use the PAN9026 module to its full extend.

Two different software environments are available for the PAN9026-IMX.

First, an Ubuntu Linux based environment is available to showcase all the different possibilities of the PAN9026 module, which also allows the user to experiment with the system using a graphical user interface. This environment is described in this Quick Start Guide.

Second, a Yocto Project Linux based environment is available to showcase the easy integration into a customer-specific build environment. This environment is described in the Development Guide which is available separately.

Both environments provide access to the Wi-Fi and Bluetooth features of the PAN9026 module by supplying a web server running on a Wi-Fi access point. After a connection to that access point has been established, it is possible to interact with the PAN9026 module with the browser.

The Ubuntu Linux based environment additonally provides a graphical user interface that many are familiar with and that allows the user to explore the PAN9026 module using a full-featured Linux desktop environment.

Please refer to the Panasonic website for related documents ⇨ 7.2 Product Information.

1.5 Wi-Fi Features

The PAN9026 module provides a web server interface through a Wi-Fi access point that devices can connect to.

It can simultaneously connect to another Wi-Fi access point and relay any internet connectivity from there.

All Wi-Fi features can be controlled from the GUI as well.

1.6 Bluetooth Features

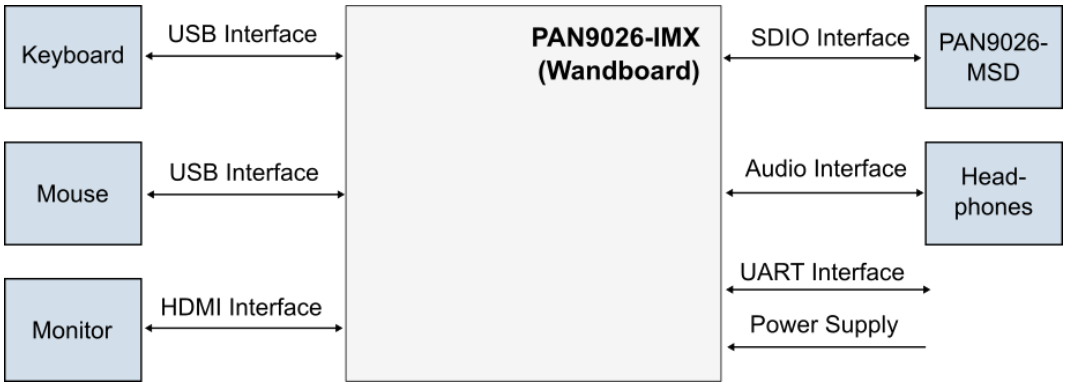
It is possible to select different Bluetooth applications through the user interface provided by the web server.

The Bluetooth Basic Rate A2DP profile allows the PAN9026-IMX to become a Bluetooth audio sink. It is possible to playback audio from a remote device that is connected via Bluetooth Basic Rate.

Alternatively the PAN9026-IMX may become a Bluetooth Low Energy proximity beacon using the AltBeacon Protocol, which may be used for indoor navigation.

All Bluetooth use cases have been implemented using Blue SDK from OpenSynergy.

2 Installation



The PAN9026-IMX consists of the following components:

- PAN9026-MSD – µSD card form factor
- Wandboard Dual (WB-IMX6U-BW)
- USB Power cable as power supply
- µSD card with Ubuntu Linux image (already inserted)

The following additional components are not included, but may be required depending on the use case:

- USB hub (the Wandboard only has a single USB connector)
- RS232 serial connection cable (interface the built-in UART port to a control PC)
- HDMI cable and HDMI monitor or TV set (show the GUI of the Ubuntu Linux)
- USB mouse and USB keyboard (interface with Ubuntu Linux)
- USB memory stick (transfer data to and from the PAN9026-MSD)
- Headphones with 3.5 mm jack (listen to Bluetooth audio)
- Some Wi-Fi capable device like a mobile phone or a tablet

2.1 Boot Card Setup

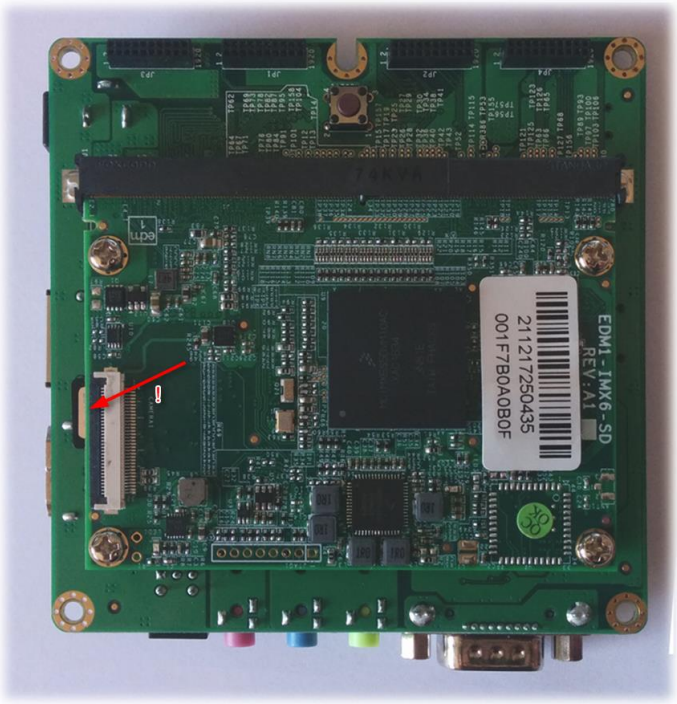
The Wandboard actually consists of two separate parts: the Baseboard that contains all the connectors and a system-on-module that contains the i.MX6 processor.

The system-on-module is located on the back of the Wandboard and may have a heat-spreader covering the processor.

The Wandboard has two µSD card slots: one for the boot medium, which is located on the system-on-module, and one for peripheral devices, which is located on the Baseboard.

Ideally the µSD card with the Ubuntu Linux image is already inserted in the µSD card slot on the system-on-module so that the Wandboard will boot from it.

If not, please notice that the µSD card slot of the system-on-module can be found on the left side when the Wandboard is turned around and the audio connectors are facing downwards:



If the µSD card needs to be changed, gently press the connector and the µSD card will spring out.

Please remember the orientation of the contacts – the contacts must face upwards when the µSD card is inserted.

2.2 Device for Remote Control

Certain functions of the PAN9026-IMX can be remote controlled via Wi-Fi, so a Wi-Fi capable device for controlling is needed.

For the sake of simplicity it is assumed that an Android mobile phone is used for this purpose, but other devices may be used as well.

2.2.1 Disabling a Mobile Data Plan

If you are using a mobile device that has a SIM card which supports a mobile data plan for accessing the internet, then it is recommended to switch off the mobile data plan while working with the PAN9026-IMX.

The main reason to do so is that the Wi-Fi access point provided by the PAN9026 module initially does not provide access to the internet.

If a mobile plan is available then Android may route any network traffic through the mobile data plan to the internet, instead of using the seemingly non-functional access point.

In order to avoid confusion, and force Android to route the network traffic through the access point of the PAN9026, it is recommended that the mobile data plan is switched off.

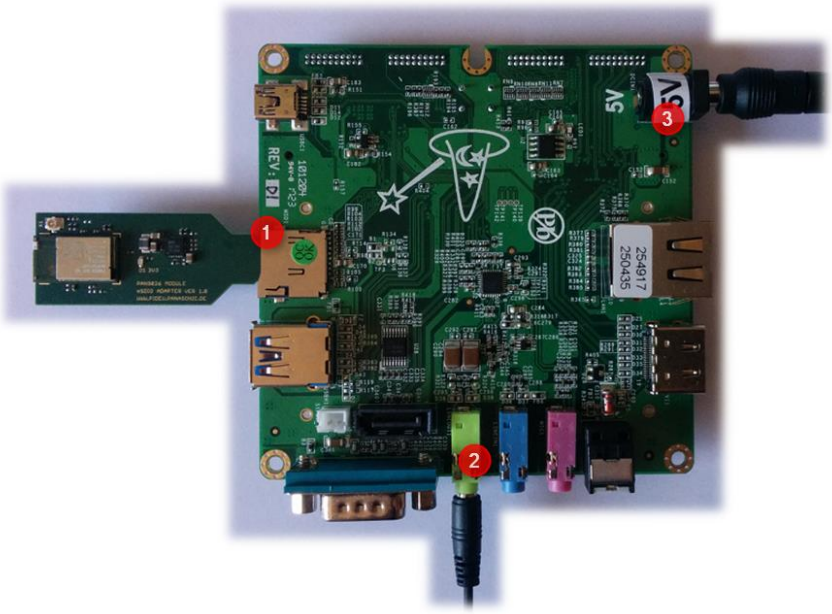
3 Basic Usage

The basic usage includes all features that can be accessed with the remote device connecting to the Wi-Fi access point only. It does not need any additional peripherals.

3.1 Basic Setup

The following components are needed:

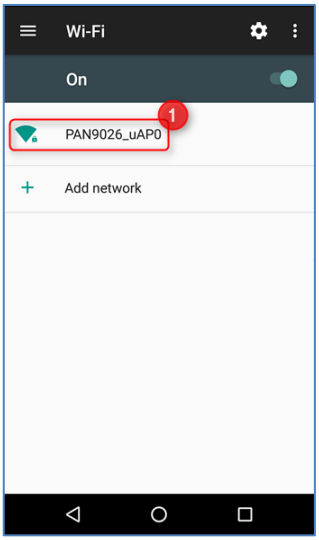
- ✓ Wandboard with µSD card with Ubuntu Linux image
- ✓ PAN9026-MSD with µSD card form factor
- ✓ Headphones with 3.5 mm jack
- ✓ Power supply



1. Insert the PAN9026-MSD into the µSD card slot of the Baseboard (1).
2. Insert the headphones with 3.5 mm jack into the green audio socket (2).
3. Insert the power supply (3).
   ➔ The system will boot up. This takes approximately one minute.

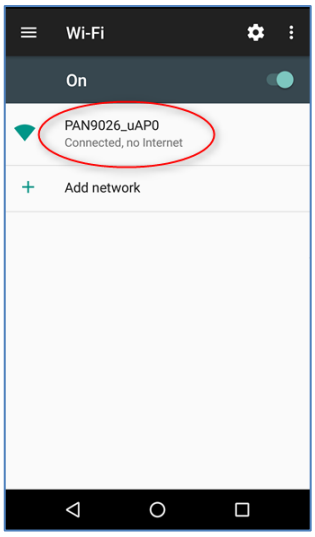
3.2 Connecting to the Access Point

1. Navigate to the Wi-Fi configuration settings of your device and enable Wi-Fi if it is not enabled already.



The access point provided by the PAN9026 module is named `PAN9026_uAP0` and will be found automatically.

2. Click **PAN9026_uAP0** to make the device connect to this access point.
   ➔ The connection will be established and is shown as `Connected, no Internet`.

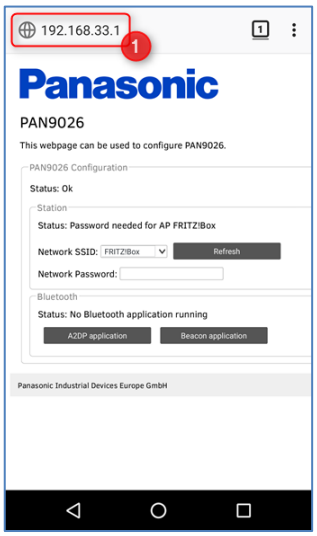


Add this point you can access the PAN9026 module just fine, but cannot use any features that required internet access yet.

3.3 Remote Controlling the PAN9026-IMX

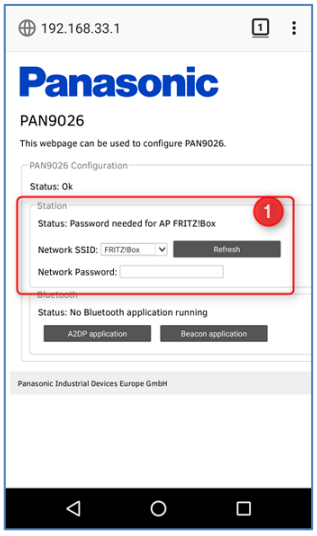
On the PAN9026-IMX a web server is running which provides the user interface for remote controlling the system.

1. Open the **web browser**.
2. Navigate to the address **192.168.33.1** to access (1).



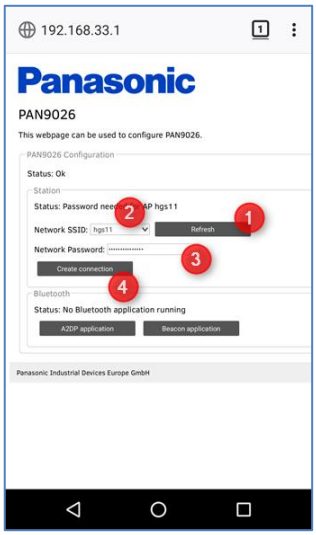
3.4 Exploring the Wi-Fi Features

The Wi-Fi features of the PAN9026 module can be controlled using the **Station** section on the web page.



The PAN9026 module is capable of connecting to an existing access point while acting as an access point itself.

The user interface is intuitive and will guide you through the possible use cases.



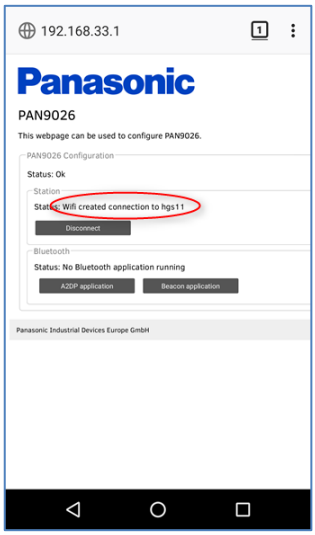
(1) Click **Refresh** to refresh the list of found access points.

(2) Click **Network SSID** to select a access point.

(3) Enter the matching password into the **Network Password** field.

(4) Click **Create Connection** to create the connection.

➔ The PAN9026 module will connect to it. This takes approximately a couple of seconds.

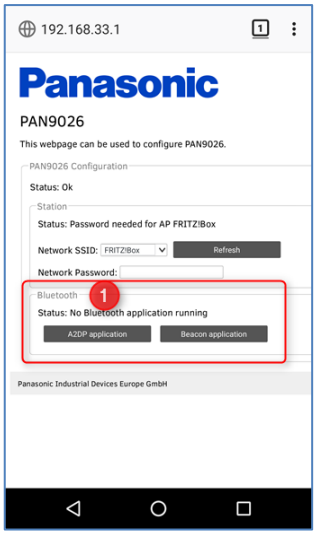


Because the PAN9026 is connected to an access point with internet connection, your device is now able to access the internet through the access point of PAN9026-IMX as well

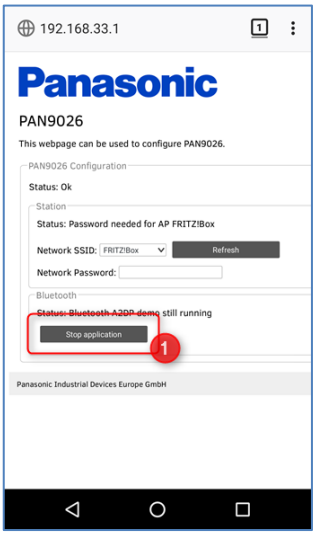
➔ Now you can use another browser window to access any page in the internet, for example `pideu.panasonic.de`.

3.5 Exploring the Bluetooth Features

The Bluetooth features of the PAN9026 module can be controlled using the **Bluetooth** section on the web page (1).

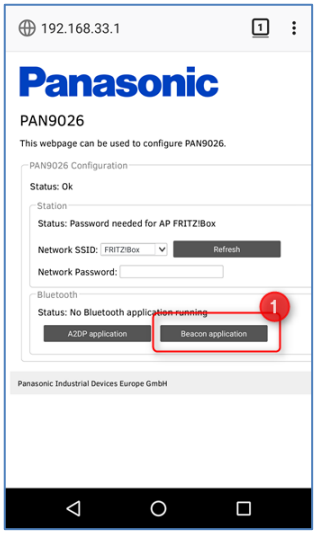


1. Click **Stop application** to stop the currently running Bluetooth application (1).



3.5.1 Bluetooth Low Energy AltBeacon

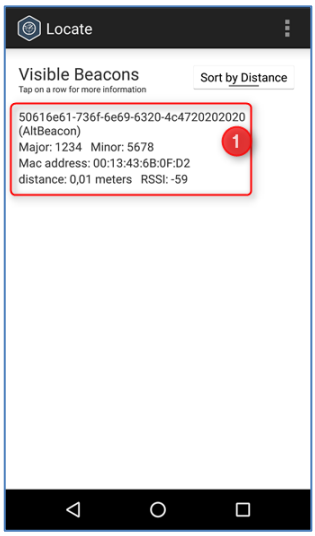
1. Click **Beacon application** to start the Bluetooth Low Energy AltBeacon application (1).



➔ The device will be advertising according to the AltBeacon specification.

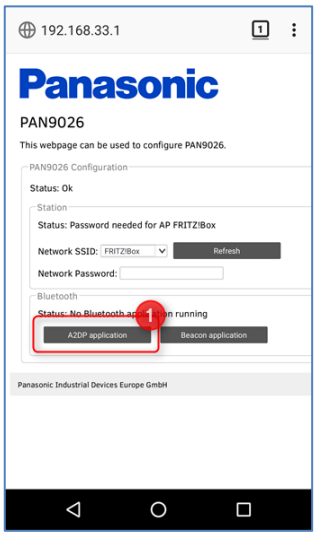
> You can use the **Locate Beacon** app from Radius Networks, Inc. to discover the PAN9026 module.

➔ In the **Locate Beacon** app the PAN9026 module will show up as a regular AltBeacon (1).



3.5.2 Bluetooth Basic Rate A2DP audio sink

1. Click **A2DP application** to start the Bluetooth Basic Rate A2DP audio sink application (1).



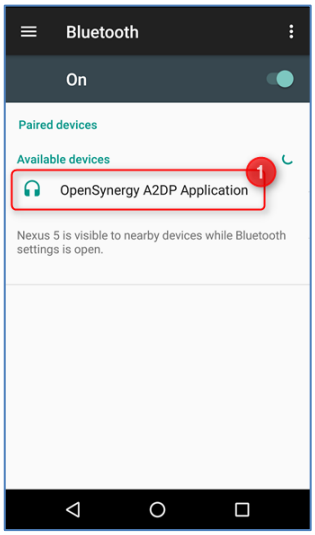
➔ The device will be available as an A2DP audio sink.

2. Navigate to the **Bluetooth settings** of your device.

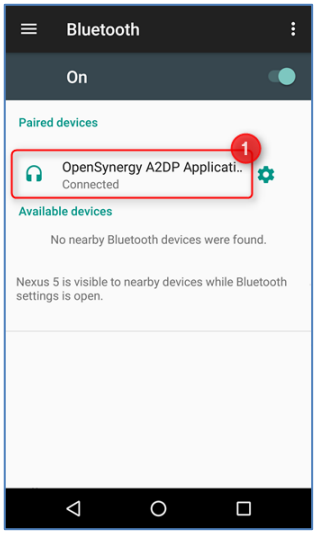
   Make sure that Bluetooth is enabled.

3. Click on the entry to connect to the PAN9026 module (1).

Usually the PAN9026 module will show up as `OpenSynergy A2DP Application`.



➔ The connection will be established and is shown as `Connected` (1). This takes approximately a couple of seconds.



➔ Now any audio that is played back on the Android device will be routed to the PAN9026 module instead and output on the audio jack of the PAN9026-IMX.

In order to verify the correct operation, start an application that will output sound, for example, an audio player, a video stream or a web radio or video from the internet.

➔ You should be able to hear the audio when you have connected some headphones to the green audio jack of the Wandboard.

If your Android device is still connected to the access point of the PAN9026 module, make sure that the PAN9026 module itself is connected to an access point with internet access; otherwise no playback from the internet is possible.

4 Full Usage

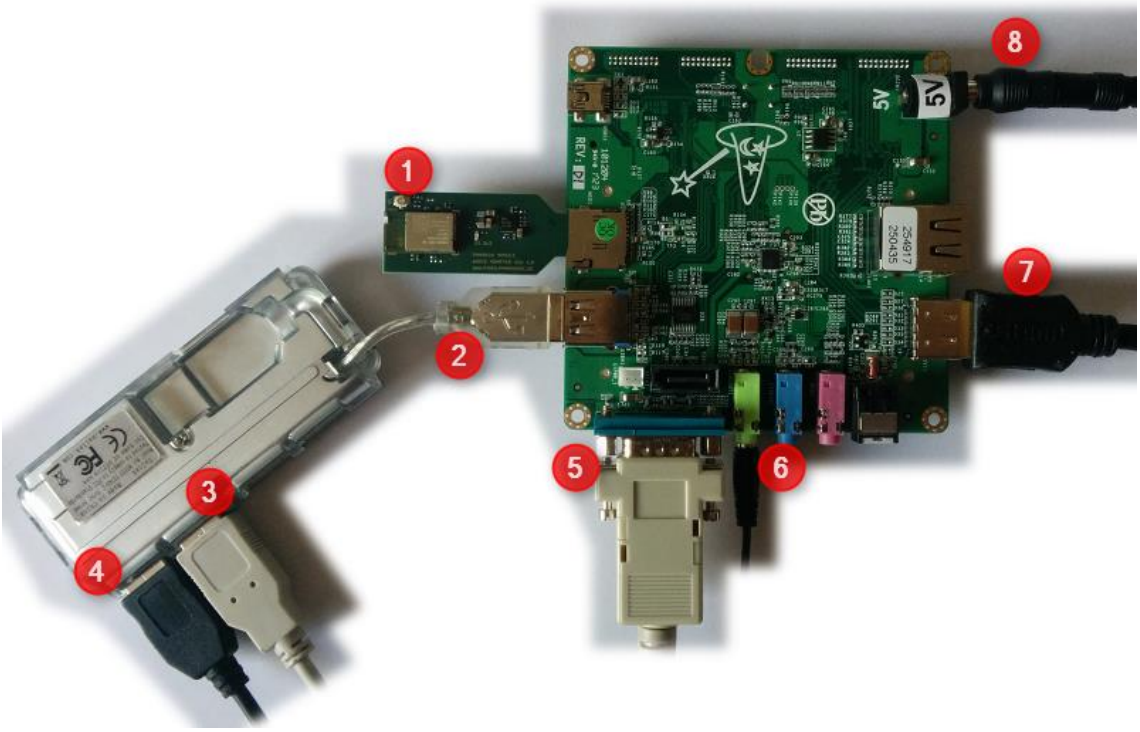
The main difference between the basic usage and the full usage is that the full usage additionally allows the user to control some of the features PAN9026 module using the graphical user interface (GUI) of the Ubuntu system.

The same functionality as in the basic setup is available and so you may need a Wi-Fi capable device for controlling as well.

4.1 Full Setup

The following components are needed:

- ✓ Wandboard with µSD card with Ubuntu Linux image
- ✓ PAN9026-MSD with µSD card form factor
- ✓ USB Hub
- ✓ USB Keyboard
- ✓ USB Mouse
- ✓ Serial Port Cable
- ✓ Headphones with 3.5 mm jack
- ✓ HDMI cable and matching monitor or TV set
- ✓ Power supply



1. Insert the PAN9026-MSD into the µSD card slot of the Baseboard (1).
2. Insert the USB Hub into the USB port of the Wandboard (2).

3. Insert the USB Mouse into the USB Hub (3).
4. Insert the USB Keyboard into the USB Hub (4).
5. Connect the Serial Port Cable to the PC (5).
6. Insert headphones with a 3.5 mm jack into the green audio socket (6).
7. Insert the HDMI cable and connect it to an external HDMI monitor (7).
8. Insert the power supply (8).
   ➔ The system will boot up. This takes approximately one minute.

Please wait approximately one minute so that the system can boot up normally.

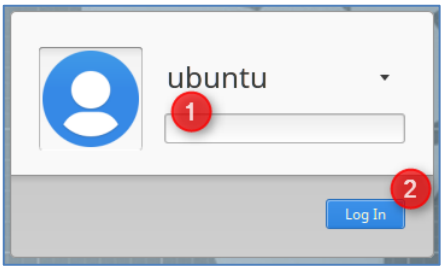
During the boot process different resolutions are used on the HDMI output. This may confuse the attached monitor, especially when a TV set is attached.

If no output can be seen on the attached monitor, please reselect the signal source to force the monitor to update the signal sources.

4.2 Login

You should be able to monitor the boot process of the system on the attached monitor.

When the boot process is finished you will presented with a login screen.



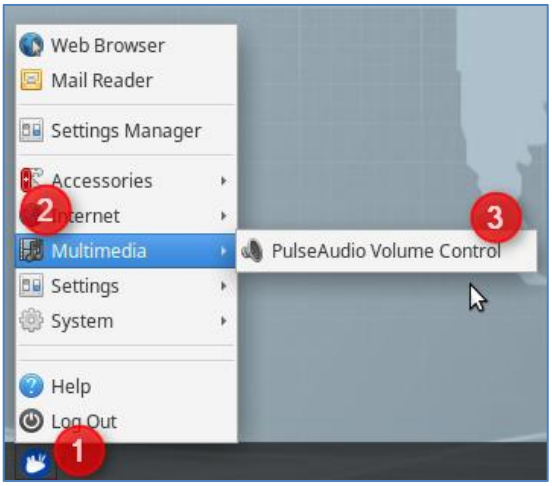
1. Enter the password `ubuntu` (1).
2. Click **Log In** (2).

The username of the default user is **ubuntu** and the password is always `ubuntu` as well.

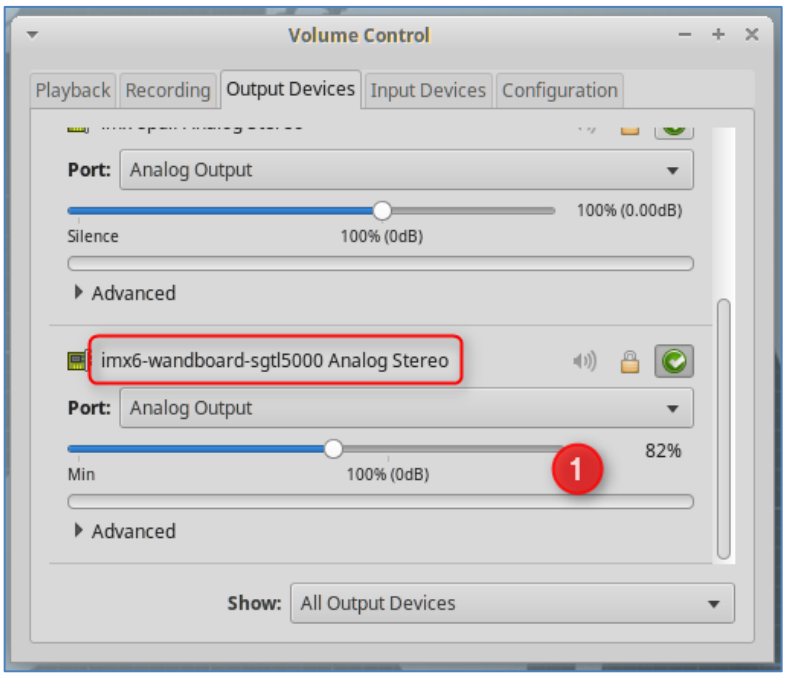
4.3 Audio Configuration

The audio configuration can be configured using the **PulseAudio Volume Control** tool.

It can be found in the main menu (1) > **Multimedia** (2) > **PulseAudio Volume Control** (3)



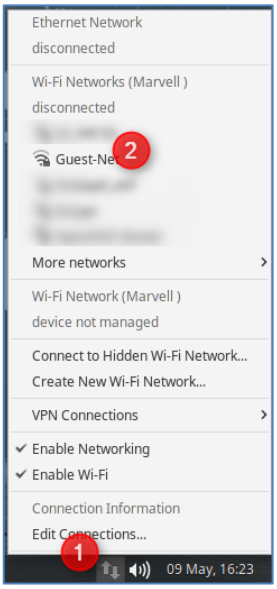
The volume can be controller in the **imx6-wandboard-sgtl5000 Analog Stereo** section (1).



4.4 Wi-Fi Configuration

The Wi-Fi configuration can be configured using the **Network Manager Applet** in the **Indicator** section of the task bar.

1. Click on the icon in the **Indicator** section to open the applet (1).



2. Select an appropriate entry in the list of Wi-Fi Networks to establish a connection (2).

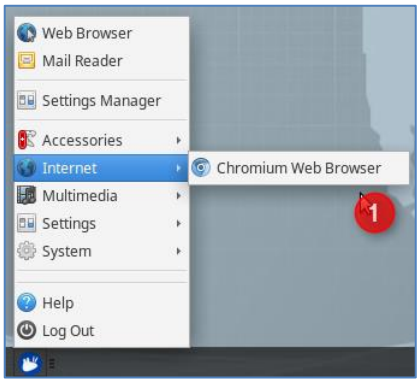
➔ The result of any network operation will be shown in a pop-up message in the upper right corner.

Please note that when the Wi-Fi settings are manipulated both through the web interface and the Network Manager applet, the state displayed on either side may be incorrect.

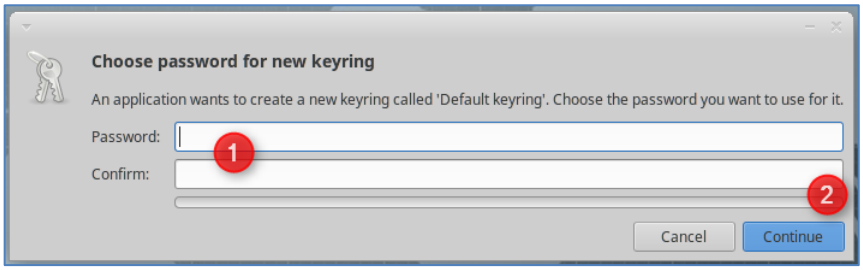
On the web interface a reload of the page may be necessary.

4.5 Network Access

After a connection to a network has been established, any network application may be used. For example, the **Chromium Web Browser** can be used to browse the web (1).



The user must create a password for the keyring. The keyring is a place where all security related information for a user are stored.



1. Enter a password into the **Password** field (1).

The suggestion is to use the default password `ubuntu` here as well.

2. Click **Continue** (2).
   ➔ Now any web page can be accessed.

5 Managing the Software Package

During the evaluation of the system it might be necessary to start from scratch or update an existing installation.

The following chapters explain how this can be done.

5.1 Recreating the SD Card Image

The SD card image for the PAN9026-IMX can be downloaded from the **Downloads** section of the PAN9026 module.

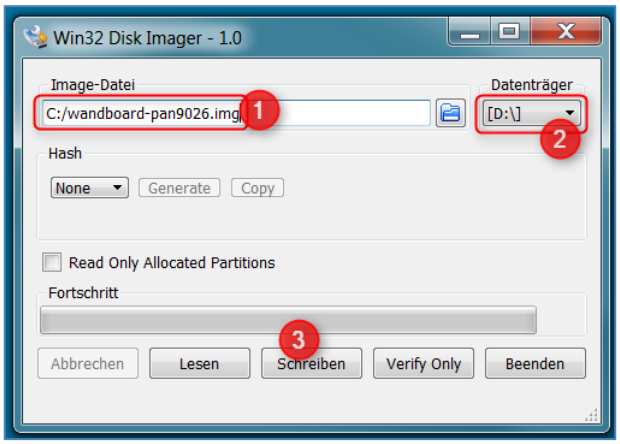
Please refer to the Panasonic website for related documents ⇨ 7.2 Product Information.

It needs to be written to the existing or a new SD card.

How this can be achieved depends on the host system that is used.

5.1.1 Using Windows

With Windows you can use the **Win32 Disk Imager** or a similar tool to write the SD card image to a SD card.



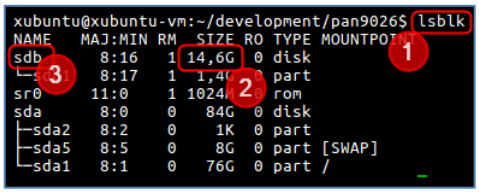
Select the image file and make sure to choose the right destination before writing the SD card image to the desired target drive.

1. Select the image file (1).
2. Select the right destination (2).
3. Click **Write *(Schreiben)*** to write the SD card (3).

5.1.2 Using Linux

The most straight-forward way is to use the **dd** tool on the command line.

1. Insert the target SD card into the device.
2. Open a terminal application window.
3. Use the **lsblk** command to find out the device file name of the SD card (1).



4. Check the **SIZE** column in order to find the SD card (2).
5. Remember the name from the **NAME** column.
6. Enter the following code into the **dd** command to write the SD card image to the desired target drive:

   `sudo dd if=wandboard-pan9026.iso of=/dev/sdb bs=1M`

> `sudo` is used because usually only the root user is allowed to write to device files like `/dev/sdb`.

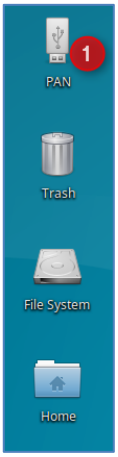
5.2 Updating the Installation

The SD card image that comes with the PAN9026-IMX already has the PAN9026 Software Package pre-installed.

New releases of the PAN9026 Software Package might be released and so it might be necessary to update the installation.

The PAN9026 Software Package comes in the form of a compressed bash script and is named `pan9026.bsx`

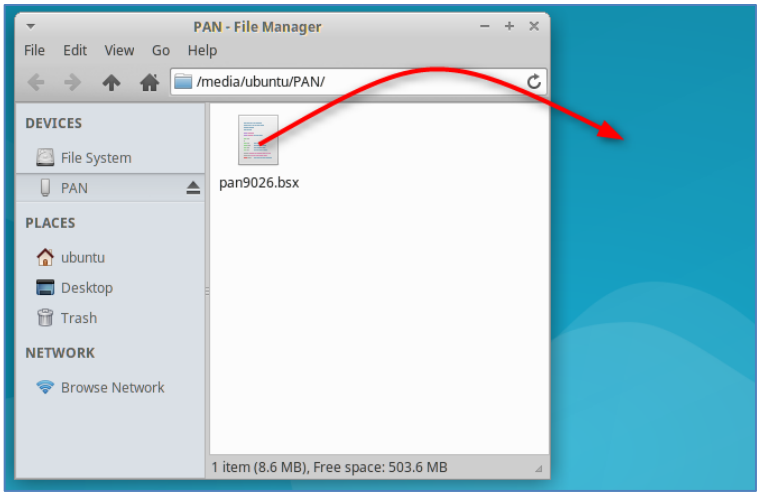
1. Copy the `pan9026.bsx` on an USB flash drive.
2. Attach the `pan9026.bsx` to the PAN9026-IMX.
   ➔ The USB flash drive will be presented on the desktop.



3. Double-click the icon on the desktop (1).

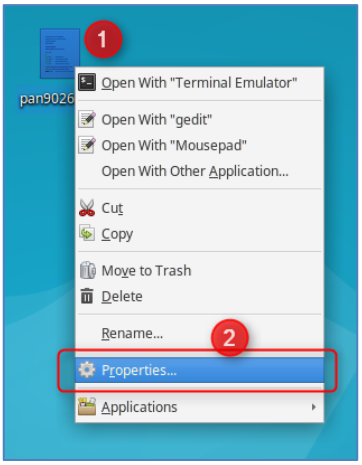
If it is not possible to execute `pan9026.bsx` from a regular USB drive, so it must be copied to the desktop.

1. Copy the file to the desktop using drag and drop from the USB driver folder to the desktop.



The permissions of the file `pan9026.bsx` must be changed so that it can be executed.

2. Right-click `pan9026.bsx`. (1).
3. Click **Properties…** (2).

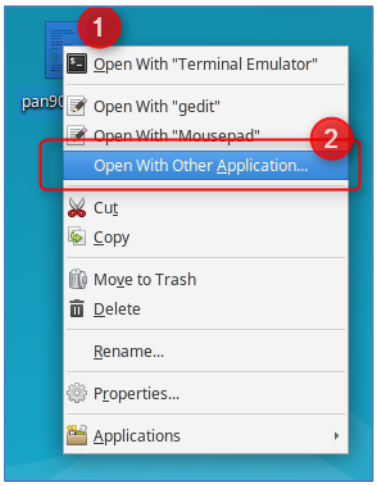


4. Click **Permissions** (1) > **Allow this file to run as a program** (2).

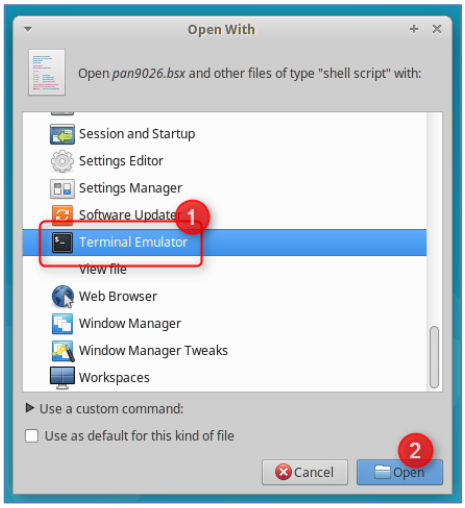
5. Click **Close** (3)**.**

➔ Now the `pan9026.bsx` can be executed by using the **Terminal Application.**

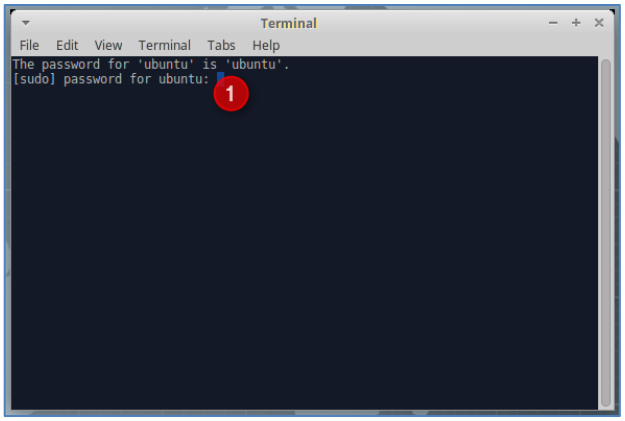
1. Right-click `pan9026.bsx` (1).
2. Click **Open With Other Application…** (2).



3. Click **Terminal Emulator** (1).
4. Click **Open** (2).



5. Enter the password for ubunto to finish the installation (1).



6. Press any key to reboot the system.
   ➔ The installation is finished.

If due to whatever reasons the system should not be rebooted at this point, press [CTRL] [C] to terminated the script.

6 Troubleshooting

6.1 Resize the Root Partition to Maximum Size

The original SD card image is only about 1.5 GB in size. Even if it is written to a bigger SD card, the system will not use the remaining space automatically.

The following steps have to be executed as the root user in order to resize the filesystem to occupy all the remaining space on the SD card as well.

1. Open a Terminal Window and become the root user:
   ```
   sudo su -
   ```
2. Modify the existing partition table to occupy all the remaining space on the SD card:
   ```
   echo ", +" | sfdisk --no-reread -N 1 /dev/mmcblk2
   ```
3. Make sure the Linux kernel gets to know the new partition size:
   ```
   partprobe /dev/mmcblk2
   ```
4. Resize the existing filesystem on that partition:
   ```
   resize2fs /dev/mmcblk2p1
   ```
5. Reboot the system for a clean start:
   ```
   reboot
   ```

6.2 Fix a Non-Booting System

The full setup contains a fully running Ubuntu system, which needs to be properly powered down before the system can be shut off.

Simply cutting off the power supply can lead to a filesystem corruption which might leave the system in an un-bootable state.

If this happens the following message will be shown on the serial console while booting:

```
Welcome to emergency mode!
Press Enter for maintenance
(or press Control-D to continue).
```

If this happens the following steps have to be executed to correct the problem.

1. Remount the root filesystem:
   ```
   mount -r -o remount /
   ```
2. Execute a file system check on the partition containing the root filesystem:
   ```
   fsck.ext4 /dev/mmcblk2p1
   ```
3. Reboot the system:
   ```
   reboot
   ```
   ➔ Now the system should start up correctly again.

6.3 Update the System

The system is a regular Ubuntu Linux system, which means that system-level tools like `apt-get` are available to update the system or install additional packages.

7 Contact Details

7.1 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

7.2 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
  ⇨ https://pideu.panasonic.de/products/wireless-modules.html

- For complete Panasonic product details in **North America**, visit
  ⇨ http://www.panasonic.com/rfmodules