KTDG102 USB Dongle

Getting started guide

Overview

This document is intended for Kirale customers, especially system integrators, about to implement the KTWM102-xx device in their application but needing to first test the performance and the functionalities of the device.

So the aim of the guide is to getting started with KTDG102 USB Dongle.

Kirale provides different firmware compilations for the KTDG USB Dongle for different purposes:

- General KiNOS to set up the dongle as a Thread node.
- IEEE 802.15.4 Sniffer.
- Golden reference KiNOS in order to run in-house Thread Certification testing.

For this reason, KTDG USB Dongles are shipped without any specific pre-loaded firmware so that the user can decide which one to flash to begin using it. Follow the next sections of this guide to do it.

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CONTACT INFORMATION

Kirale Technologies S.L.
General Vara de Rey 9, 5B
26001 – Logroño (SPAIN)

+34 941 578 578
kirale@kirale.com
www.kirale.com

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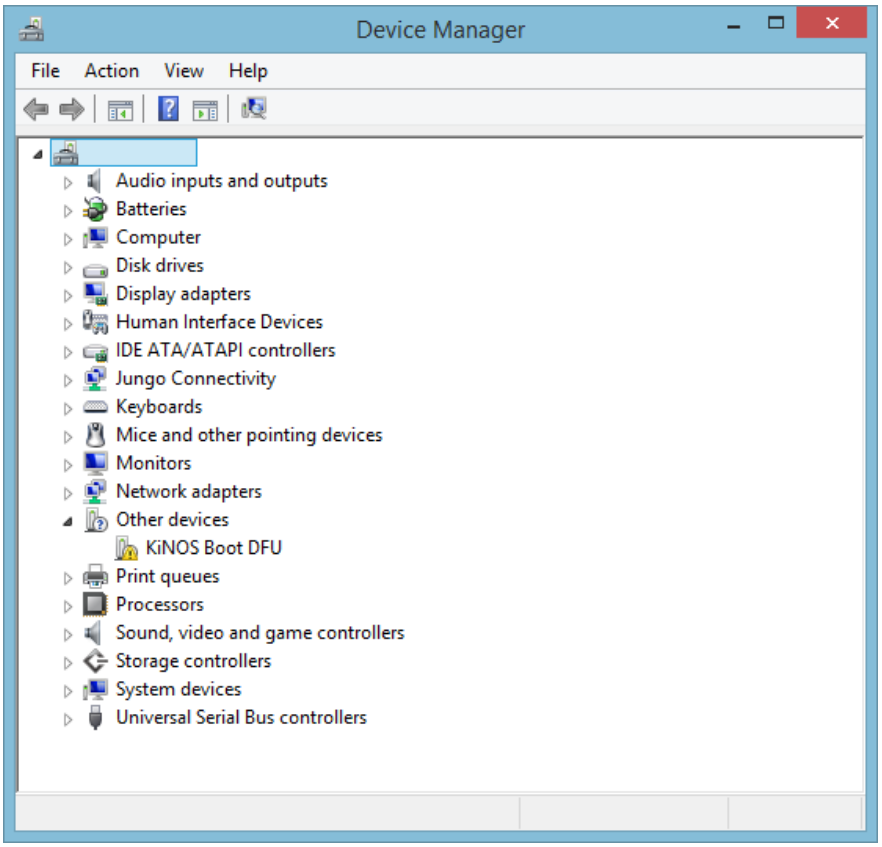
REVISION HISTORY

Date	Revision	Changes
02/2018	1	Initial release

1. Bootloader - USB driver installation

Plug Dongle into a free USB port of your computer. If a valid firmware image has not been yet loaded, the Dongle's LED will begin fast flashing. This indicates that it has got into DFU mode and is waiting for firmware update. *Device Manager* will display the device as *KiNOS Boot DFU* and will put it in the *Other devices* branch.

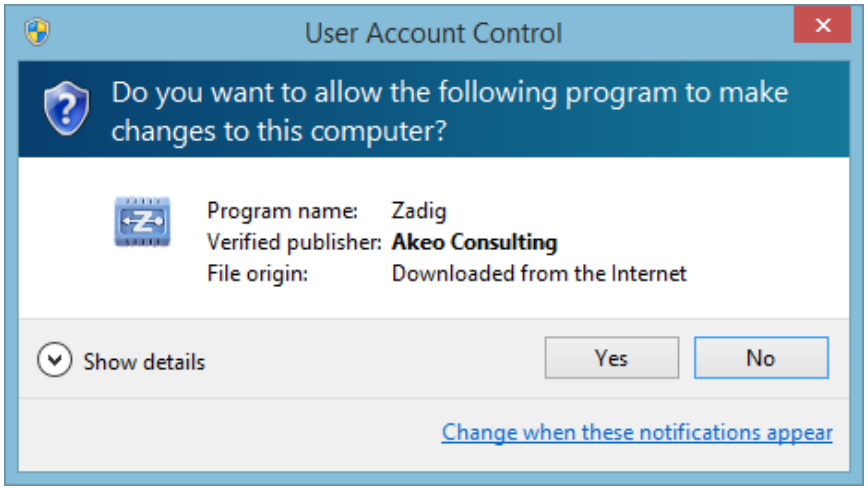


1.1 Windows

Windows systems require (the very first time) to manually install USB drivers for KTDG102 Dongle. In some cases the KiNOS Boot DFU device could be automatically installed with generic Windows drivers, but it is required to replace them.

Installing or replacing the drivers just requires a free tool called "*Zadig*". Download it from *Zadig* site http://zadig.akeo.ie/ . This application is meant to install a "libusb" compatible driver for a device.

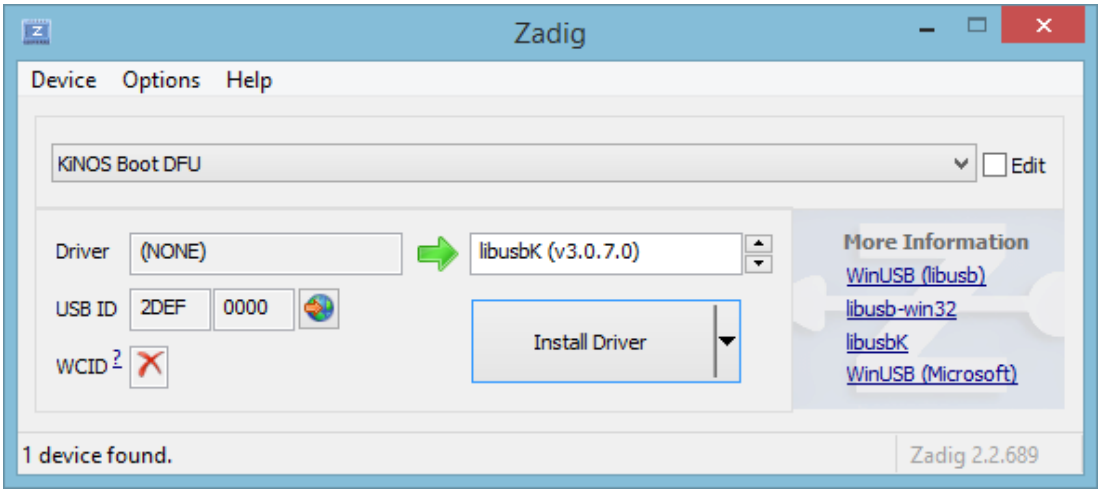
Launch Zadig (it doesn't need installation). In case of it triggers an *UAC* (User Account Control) prompt, you should answer "*Yes*".



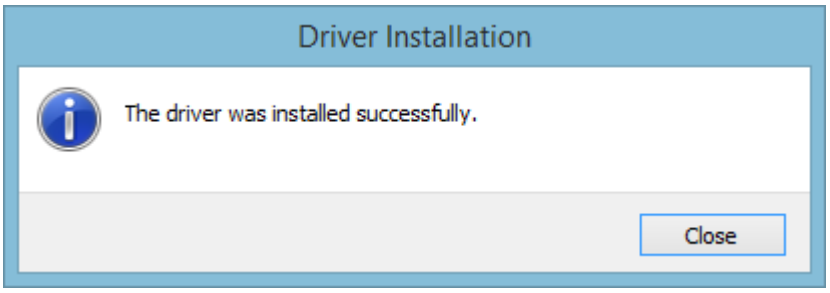
Once the application is running KiNOS interfaces should appear in the dropdown list (click on the dropdown to see all devices). It is also possible to plug the USB device after Zadig is running, as the list will refresh automatically.

If you cannot see the device listed, then it probably means that it already has a driver installed. To see USB devices that already have a driver installed, go to the *Options* menu and select *List All Devices*.

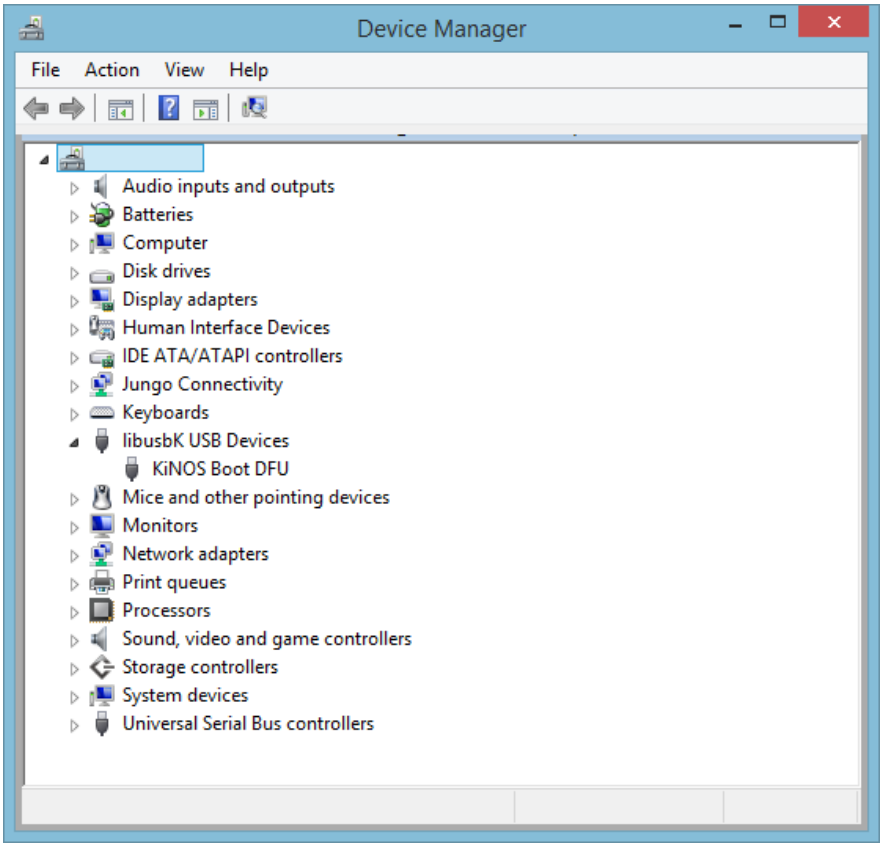
Select *KiNOS Boot DFU* from the dropdown list, select "*libusbK*" driver and click "*Install / Replace Driver*".



The process should only take a second and result in a success message.



Now, in *Device Manager*, the *KiNOS Boot DFU* should show up like this:



1.2 Linux / Mac OS

Specific driver installation is not needed for Linux-based systems with kernel versions newer than 2.6.22 and for Mac OS X systems from version 10.4 (Tiger).

2. Install “dfu-util”

The protocol used to load a firmware to Kirale KTDG USB Dongle through its USB interface is the standard DFU 1.1. So download "dfu-util" and install it:

- On Windows: download from http://dfu-util.sourceforge.net/ and extract the files in the desired folder.
- On MAC OS:

  ```
  $ brew install dfu-util
  ```

  (Get Brew)

- On Linux:

  ```
  $ sudo apt install dfu-util
  ```

3. Firmware upload

Run dfu-util and list the attached devices to find the desired device. The USB Product ID for a KiNOS DFU device in bootloader mode is `0000`.

```
$ dfu-util --list
Found DFU: [2def:0000] ver=0100, devnum=8, cfg=1, intf=0, path="1-1.4.3", alt=0,
name="KiNOS DFU", serial="8404D2000000045B"

Found Runtime: [2def:0102] ver=0100, devnum=9, cfg=1, intf=0, path="1-1.4.4", alt=0,
name="KiNOS DFU", serial="8404D2000000045C"
```

Flash the firmware file to the desired device (specifying the serial number). The transference could take several seconds.

```
$ dfu-util --download KiNOS-GEN-KTWM102-1.1.6533.62822.dfu --serial 8404D2000000045B
Match vendor ID from file: 2def
Match product ID from file: 0000
Opening DFU capable USB device...
ID 2def:0000
Run-time device DFU version 0110
Claiming USB DFU Interface...
Setting Alternate Setting #0 ...
Determining device status: state = dfuIDLE, status = 0
dfuIDLE, continuing
DFU mode device DFU version 0110
Device returned transfer size 64
Copying data from PC to DFU device
Download        [=========================] 100%       245628 bytes
Download done.
state(6) = dfuMANIFEST-SYNC, status(0) = No error condition is present
unable to read DFU status after completion
```

Once dfu-util has finished the transference of the firmware, the KTDG USB Dongle will reboot and start to apply the new firmware in the internal flash (fast led flashing). It could take several seconds as well. When the led begins to flash slowly (in stable way) the firmware flashing has finished and KiNOS firmware is operating in runtime mode.

4. Runtime - USB Driver installation.

In run-time mode KTDG102 Dongle is a USB Composite Device that combines three different USB Interface Classes: Device Firmware Upgrade (DFU), Virtual Serial (CDC-ACM) and Ethernet over USB (CDC-ECM).

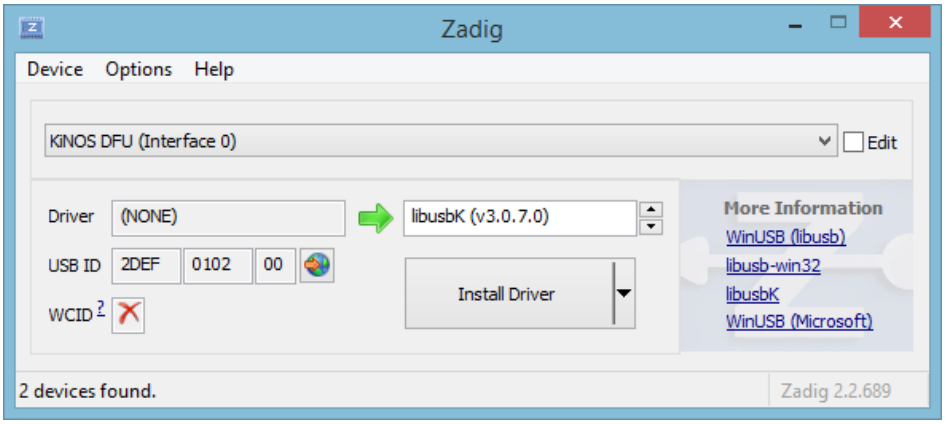
Windows does not support USB ECM model natively and thus requires a third party driver that is out of scope for Kirale Technologies.

For the other two interfaces USB driver installation is required for Windows systems. Follow the next instructions:

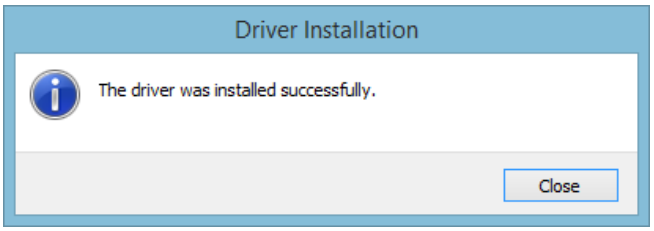
4.1 Windows

In some cases the KiNOS DFU device could be automatically installed with generic Windows drivers and appear under Virtual COM Ports. But it is required to replace it. Use "Zadig" again to install or replace USB drivers.

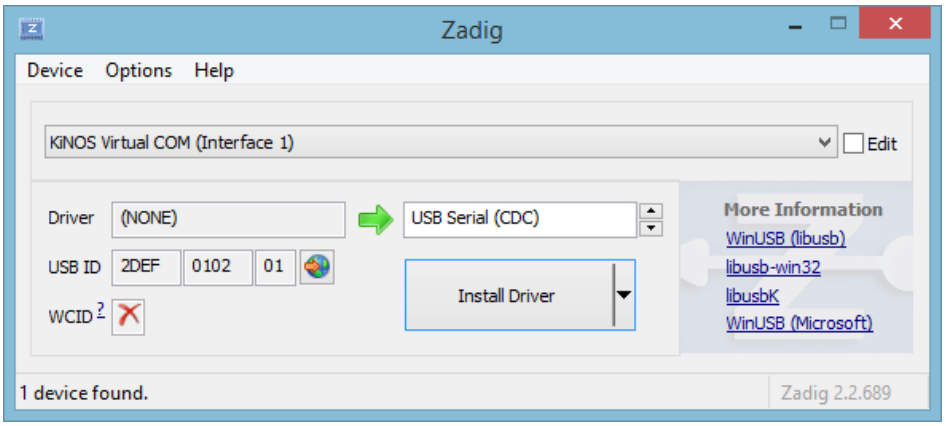
Select *KiNOS DFU (Interface 0)* from the dropdown list, select "***libusbK***" driver and click "*Install/Replace Driver*".



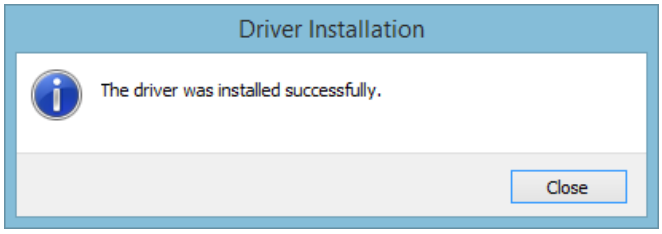
The process should only take a second and result in a success message.



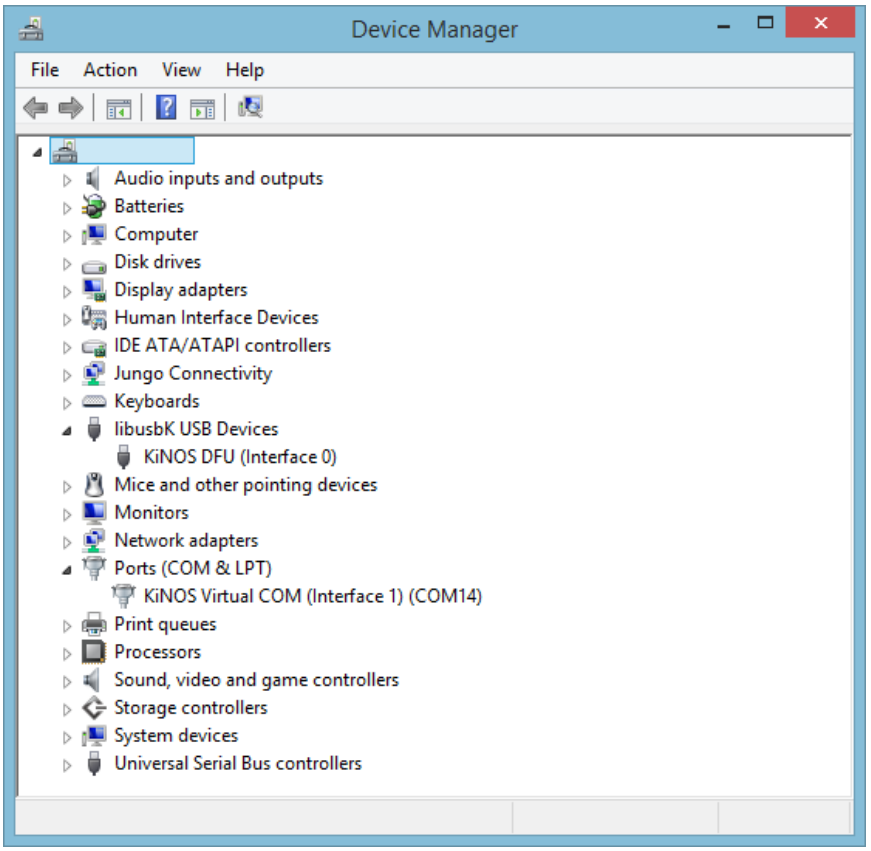
Then select *KiNOS Virtual COM (Interface 1)* from the dropdown list, select "***USB Serial (CDC)***" driver and click "*Install/Replace Driver*".



The process should only take a second and result in a success message.



Now, in *Device Manager*, the KiNOS interfaces should show up like this:



4.2 Linux

Specific driver installation is not needed for Linux-based systems with kernel versions newer than 2.6.

ⓘ USB CDC-ECM interface is disabled by default. It can be turned on by command line. For more details, see *KSH Reference Guide*.

To find the serial port number and Ethernet interface, plug Dongle into a free USB port of your computer and then open terminal and type the following:

```
~$ dmesg | tail
```

4.3 Max OS

Specific driver installation is not needed for Mac OS X systems from version 10.4 (Tiger).

ⓘ USB CDC-ECM interface is disabled by default. It can be turned on by command line. For more details, see *KSH Reference Guide*.

To find the serial port number and Ethernet interface, plug Dongle into a free USB port of your computer and then open terminal and type the following:

```
~$ networksetup –listallhardwareports
```

5. COM Terminal configuration

5.1 Windows

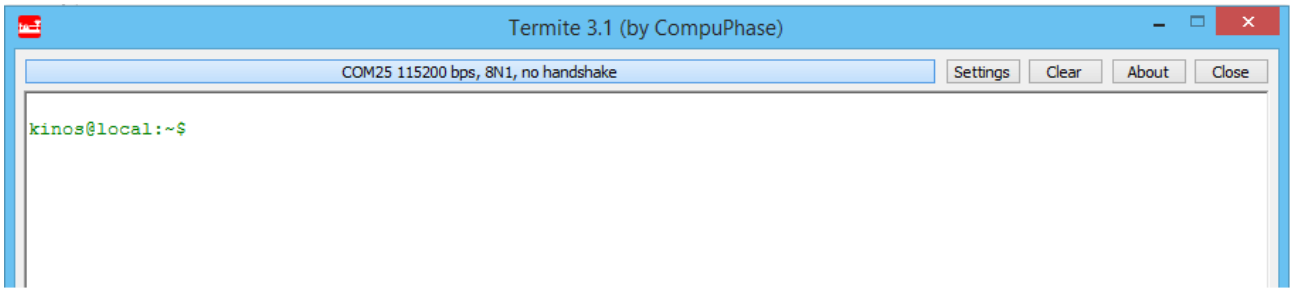
A wide variety of serial COM terminals is available for Windows system; in this guide it is used a generic one called "Termite" as example, but any other terminal could be used.

Run the serial terminal and configure next settings to serial communication with Kirale devices:

ⓘ The standard setup for the USB Serial port is 9600 baud, 8 bits, 1 stop bit, no parity.

⚠ The USB Serial terminal must be configured to append a "CR" character when Enter key is pressed.

Once configured, select one of the serial ports displayed in your Device Manager for the KiNOS Virtual COM, then to test if the interface to Kirale USB device is up and running just press "Enter" and the KiNOS prompt must be returned.



ⓘ It is recommended to enable Local echo for transmitted commands readability.

5.2 Linux / Mac OS

If you do not already have one, install a serial COM serial terminal at your choice. In this guide it is used "Picocom" as example, but any other could be used.

The configuration needed for the serial communication is the same than for "Windows systems".

```
~$ picocom -c --omap lfcr /dev/ttyACM0
```

`-c`	: Enable local echo
`--omap lfcr`	: Map output line feed to carriage return
`/dev/ttyACM0`	: The serial device assigned by Linux. User dmesg | tail when connected to check the actual device name.

Use Ctrl+a and Ctrl+x to leave the program.

END OF THIS DOCUMENT