



Application Note

AN_220

FTDI Drivers Installation Guide for Linux

Version 2.1

Issue Date: 2017-06-07

The purpose of this application note is to provide users of FTDI chips with a simple procedure to install FTDI drivers for FTDI devices used with Linux.

Use of FTDI devices in life support and/or safety applications is entirely at the user's risk, and the user agrees to defend, indemnify and hold FTDI harmless from any and all damages, claims, suits or expense resulting from such use.

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1 Introduction

The purpose of this application note is to provide users of FTDI chips with a simple procedure to install FTDI drivers for FTDI devices using Linux.

1.1 Overview

FTDI has two types of drivers for all supported operating systems. These are the virtual COM port driver (VCP) and the D2XX API driver. Since the FTDI VCP driver is built into the Linux kernel, this document will focus on the installation of the D2XX driver.

To ensure all FTDI devices have VCP driver support, FTDI recommends installing the latest kernel release on the Linux system. In Linux, the VCP drivers will appear as `/dev/ttyUSBx`.

How to verify the built-in COM port:

- Plug in an FTDI based design/module/cable
- Open a terminal window, and enter
`dmesg | grep FTDI`
- The output on the terminal window should contain the following:
[10170.987708] USB Serial support registered for FTDI USB Serial Device
[10170.987915] ftdi_sio 9-1:1.0: FTDI USB Serial Device converter detected
[10170.991172] usb 9-1: FTDI USB Serial Device converter now attached to ttyUSB0
[10170.991219] ftdi_sio: v1.6.0:USB FTDI Serial Converters Driver

In Linux, the VCP driver and D2XX driver are incompatible with each other. When a FTDI device is plugged in, the VCP driver must be unloaded before a D2XX application can be run. Use the remove module (`rmmod`) command to do this:

```
sudo rmmod ftdi_sio
sudo rmmod usbserial
```

When the FTDI device is power cycled or reset the VCP driver will be reloaded. The `rmmod` process must be repeated each time this occurs. It is possible to write a simple script that unloads the VCP driver before running the D2XX application.

2 Installing the D2XX driver

Download a suitable Linux D2XX driver from the [FTDI D2XX driver web page](#). The driver files are contained in a tar gzip file.

Each CPU architecture has a separate driver file. The options are:

- x86 – for 32-bit IA-32 CPUs,
- x64 – for 64-bit Intel-64 (x86-64) CPUs,
- ARM – for ARM CPUs, choice of hard-float, soft-float.
- MIPS32 – choice of hard-float and soft-float.

Note that the ARM architecture is backward compatible but v5, v6 and v7 options are available. The ARM v6 driver is suitable for Raspberry Pi.

The archives contain the D2XX driver and directory of sample code. Most Linux distributions have utilities for extracting tar gzip archive files, such as the Archive Manager in Ubuntu. Figure 2.1 shows a screen capture showing the contents of the tar gzip archive.

The version number is used in the driver file names and will change on each release. In this document it is assumed to be version 1.1.12 and in the instructions the version number is *italicized*. Replace the version number with the version numbers used in the release.

It is possible to have multiple versions of the driver co-existing on a single system allowing control over which versions to use for an application.

Click on Extract and save all the files to your desired target directory.

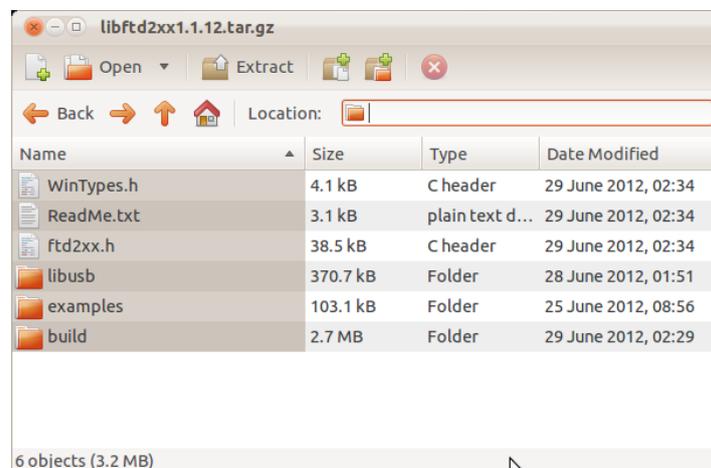


Figure 2.1 Contents of D2XX driver archive

As an alternative, you can use the Linux gunzip and tar commands to extract the driver files. Open a Linux terminal window and enter:

```
gunzip libftd2xx1.1.12.tar.gz  
tar -xvf libftd2xx1.1.12.tar
```

2.1 Linux Shared Object and Static Library Install

Open a Linux terminal window at the location where the driver files were extracted.

2.1.1 Native Compiling

In this section the driver statically linked libraries and shared objects are copied to the /usr/local/lib area for use by the native compiler.

All driver files are copied and symbolic links created using the Linux sudo command for root permissions.

```
sudo cp /releases/build/lib* /usr/local/lib
```

Make the following symbolic links and permission modifications in /usr/local/lib:

```
cd /usr/local/lib
sudo ln -s libftd2xx.so.1.1.12 libftd2xx.so
sudo chmod 0755 libftd2xx.so.1.1.12
```

The symbolic link is used to select a default driver file. Any program can be linked against a specific version of the library by using a version numbered library file.

2.1.2 Cross Compiling

To use the driver when cross compiling it must be copied to a suitable library path used by the cross compiler. There are several options for this depending on the cross compiler and user preferences.

In this section the path to run the cross compiler will replace the phrase "arch-gcc" in commands.

The compiler library search path can be found by running the compiler gcc utility with the "-print-search-dirs" option only. The following command will format the output for display.

```
arch-gcc -print-search-dirs | grep libraries | sed 's:/\n/g'
```

The output is a list of library search paths (in order) where the driver files can be placed and they will be found automatically by the cross compiler. Typically these are in the "/opt" area. Often one directory will end in "/usr/lib", if this exists then this would be the preferred location.

Alternatively they can be installed at an arbitrary location such as /usr/local/arch/lib. The path does not need to be on the libraries search path.

In the commands following, the full path to the library directory will be written as "arch-lib".

```
sudo cp /releases/build/lib* arch-lib
cd arch-lib
sudo ln -s libftd2xx.so.1.1.12 libftd2xx.so
sudo chmod 0755 libftd2xx.so.1.1.12
```

The example code assumes a native compilation environment and therefore needs to be updated to reflect the new location of the libraries and path of the cross compiler.

Within the examples directory there are 2 files which need modified.

The "Makefile" will need modified to change the "CC" definition to point to the cross compiler.

```
CC=arch-gcc
```

The "Rules.make" file will also need modified to change the "CC" definition to point to the cross compiler and if the driver files are not placed in the library search path then the location added as a rpath. Note the comma after "-Wl".

```
CC=arch-gcc
CFLAGS=-Wall -Wextra -L. -lftd2xx -lpthread -ldl -lrt -Wl,-rpath,arch-lib
```

If the driver files are incorrectly installed or the linker cannot find them on the search path then the error message "ld: cannot find -lftd2xx" will be reported.

3 Compiling and Running Sample D2XX Applications

FTDI provides both Shared Object (.so) and Static linked (.a) D2XX libraries. Here are the installation procedures for these libraries on native systems.

3.1 Building and Running the Shared Object Examples

To verify the D2XX driver install, compile and run the EEPROM read sample program. Make sure the Linux system has the gcc compiler installed.

```
cd release/examples
```

Compile and link the examples.

```
make -B
```

Change to the read example directory.

```
cd eeprom/read
```

The name of the executable file is *read*.

Plug in the FTDI based device. Remove the VCP driver as described in section 1.1:

```
sudo rmmod ftdi_sio
sudo rmmod usbserial
```

Run the sample application:

```
sudo ./read
```

The read application will list the configuration descriptors of the attached FTDI device as follows:

```
opening port 0
ftHandle0 = 0x8e89220
Signature1 = 0
Signature2 = -1
Version = 2
VendorId = 0x0403
ProductId = 0x6001
Manufacturer = FTDI
ManufacturerId = FT
Description = USB-Serial Converter
SerialNumber = FTG5FL9U
```

3.2 Building and Running the Static Library Example

The static library example is simple to run and execute.

```
cd release/examples/static
```

Remove any previous library built for another target.

```
rm lib*
```

Copy the static library to current directory from the copy in the driver distribution file. This could also be copied from /usr/local/lib or the cross compiler library used in section 2.1.2.

```
cp ../../build/libftd2xx.a .
```

Compile and link the example.



```
make -B <ret>
```

Run the test program.

```
sudo ./static_link
```

This application will write and read 16 bytes to port 0 of any FTDI USB ->UART device with a loopback connector attached:

```
Device 0 Serial Number - FTVESNIO
```

```
Opened device FTVESNIO
```

```
FT_Read read 16 bytes
```

```
Closed device FTVESNIO
```

4 Contact Information

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Appendix A – References

Document References

[AN_146 USB Hardware Design Guides for FTDI ICs](#)

Acronyms and Abbreviations

Terms	Description
USB	Universal Serial Bus
USB-IF	USB Implementers Forum

Appendix B – List of Tables & Figures

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Appendix C – Revision History

Document Title: AN_220 FTDI Drivers Installation Guide for Linux
Document Reference No.: FT_000723
Clearance No.: FTDI# 302
Product Page: <http://www.ftdichip.com/FTProducts.htm>
Document Feedback: [Send Feedback](#)

Revision	Changes	Date
1.0	Initial Release	2012-07-11
1.1	Updated release	2016-04-05
2.0	Added cross compiler help	2016-06-06
2.1	Table of contents regenerated	2017-06-07