SKYSENSE

BCON[1]

User Guide

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Contents

Introduction

Overview of the BCON1 Transmitter

BCON1 is an Automatic Dependent Surveillance-Broadcast (ADS-B) Stand Alone Transmitter for Class B0 equipment. BCON1 1090 MHz Non-Transponder-Device (NTD) is implemented independent of a Mode S transponder to provide the implementation of Extended Squitter (ES) for drones and other light vehicles/airplanes. The carrier frequency of ADS-B Message transmission is 1090 ±1 MHz, the ADS-B transmitted message is broadcasted automatically once per second. The Downlink Format (DF) 18 is used for transmitting ADS-B Messages from BCON1 transmitter.

BCON1 transmitter accepts own GPS position information via serial (RS232) interface connected directly to GPS receiver or via autopilot. The transmitter is preconfigured to use built in precision altimeter which provides accurate altitude data. BCON1 transmitter support mutual suppression which is needed when the ADS-B equipment is used along with pulse L-band equipment on board.

BCON1 can be supervised through proprietary Skysense Serial Communication Protocol (SSCP) or Command Line Interface (CLI) via a serial interface using terminal software or BCON1 windows application.

Specifications

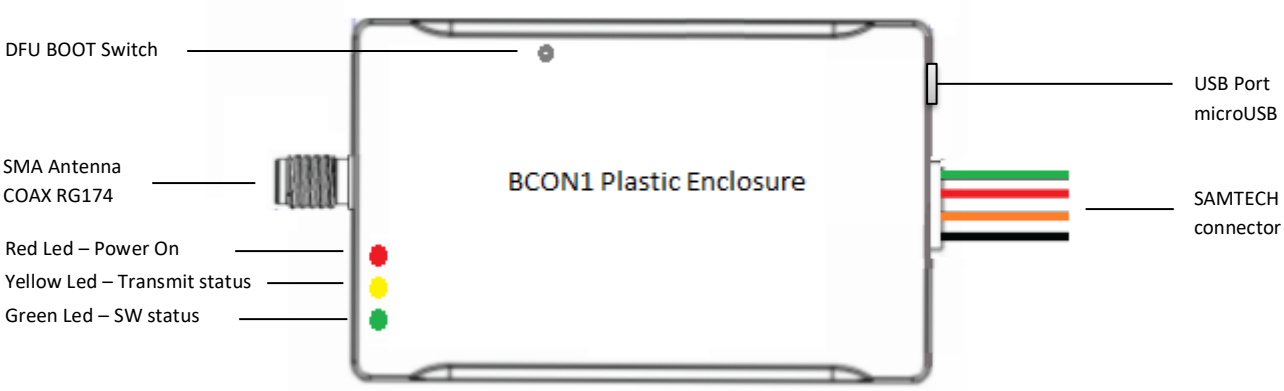
General	
Transmitter power	70W/48.45 dBm
Operating altitude:	Unrestricted
GPS:	NMEA-0183, RS232, adjustable data rate
Altitude:	Internal altitude encoder (0.1m accuracy) Max 5574 m (50 kPa min),Min -698 m (110 kPa max) Internal temperature sensor Min - 40 °C, max 85 °C
Electrical	
Power supply:	5V-15V
Power consumption (active):	2.5W
Power consumption (stand-by):	<0.1W
Compliance (on-going)	
FAA/EASA:	(E)TSO-166b
MOPS:	DO260B, Class B0
Software assurance:	DO-178C
Hardware assurance:	DO-254
Operating Environment:	DO-160G
Physical	
Weight:	35g (without enclosure)
Dimensions:	45 x 90 x 12 mm
Temperature range:	–30 – 85 °C

Get Started

Unpacking your parcel

Verify that following three items are included in the parcel:

- One BCON1 transmitter. The picture below shows BCON1 with its various interfaces
- One USB cable to connect BCON1 to your computer. This cable is only used for configuration of BCON1.
- One SAMTECH cable harness (with wires only on one end) to connect BCON1 to your drone.



Connect BCON1 to your computer

To use BCON1 with your computer, you need:

- RS232 (DSUB9 male)-USB adapter cable (*not included with BCON1*)
- Micro-USB cable for power supply and configuration (Included with BCON1)
- A PC with a USB port, and with Windows Operating system (Windows 7 or later version).
- Terminal emulator program.
- BCON1 GUI client

Set up BCON1

Setup on BCON1 can be made with either an RS232 terminal port (e.g. HyperTerminal) or using BCON1 GUI client.

Install BCON1 client

Install the latest version of windows application that is available on github public repository https://github.com/Skysense-io/tools/tree/master/bcon1-client-gui

Install Terminal application

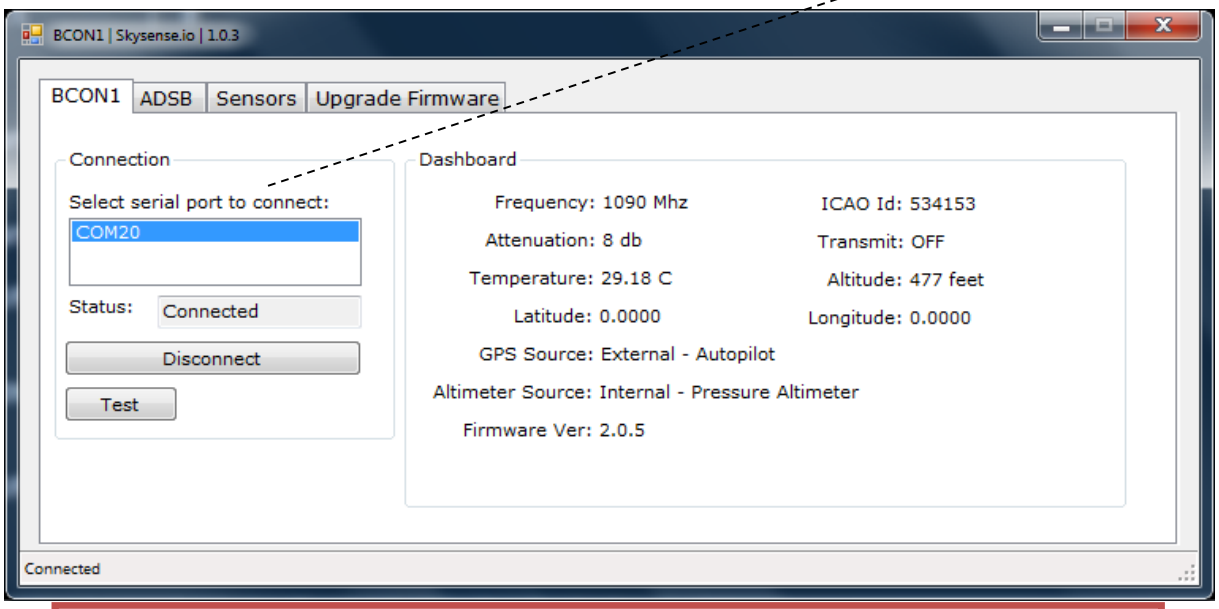
Download the terminal application of your choice and then open the application and follow the on-screen instructions.

Setup via BCON1 client

To connect BCON1 to your computer you need a USB cable, connect the microUSB end to the BCON1 and the standard USB end to the PC/Laptop. If the BCON1 is properly connected then the PC will detect the new hardware as **CDC Virtual COM**, this COM port enables RS232 communication to BCON1 via USB cable. Follow the instructions in Appendix C to install the device drivers.

Connection

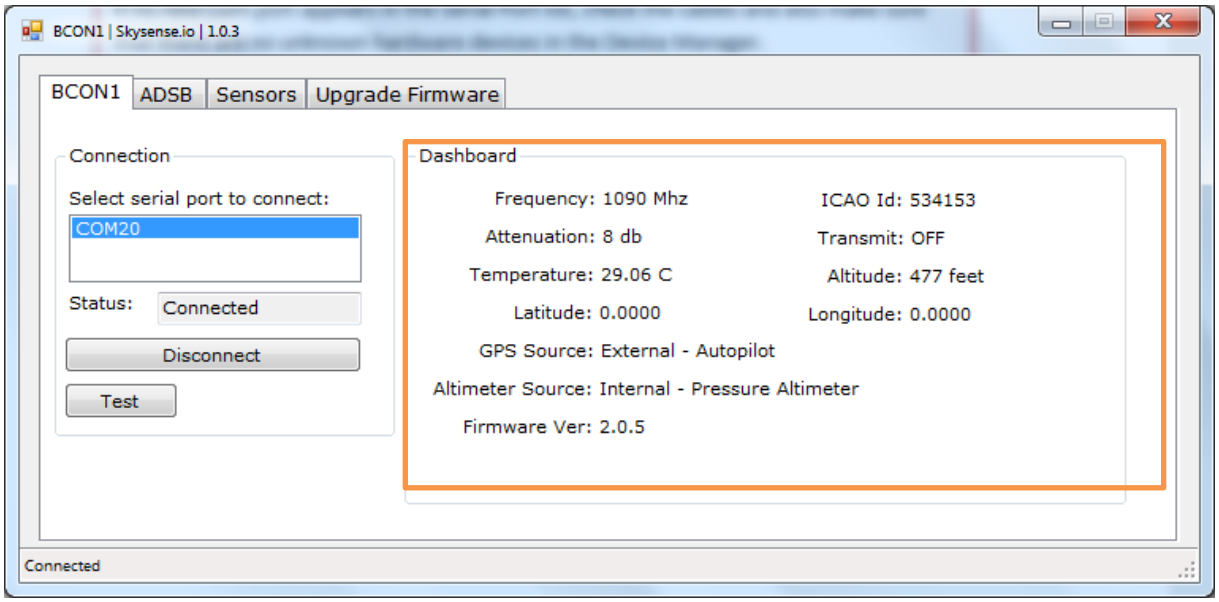
Then open the GUI client, on **BCON1 tab** a new COM port should appear in the serial port list. Click on the serial port to establish a connection with the BCON1.



If no new Com port appears in the Serial Port list, check the cables and make sure that there are no unknown hardware devices in the Device Manager.

Dashboard

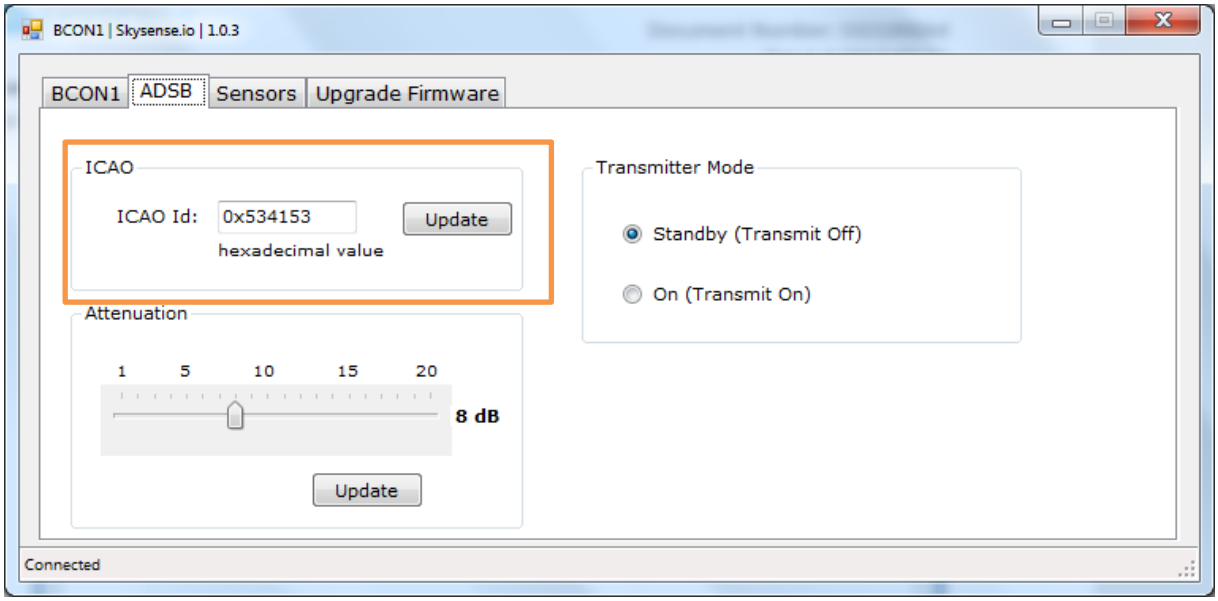
This section provides selection of key settings and data.



Configure ICAO Id

Go to **ADSB** tab, and then change the transmitter mode to **Standby**.

- **ICAO Id** text field and **Update** button will be enabled.
- Enter the new ICAO Id in hexadecimal and press the **Update** button to save changes.

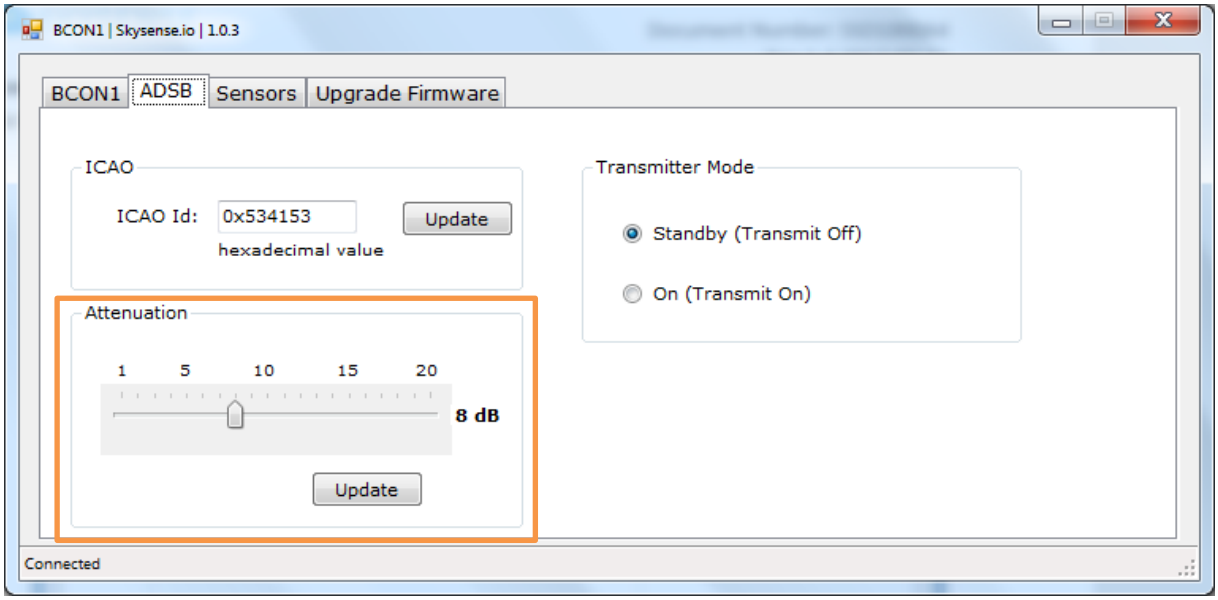


Changes to ICAO Id & Attenuation are not permitted when the transmitter mode is set to **On**.

Change Internal Attenuation

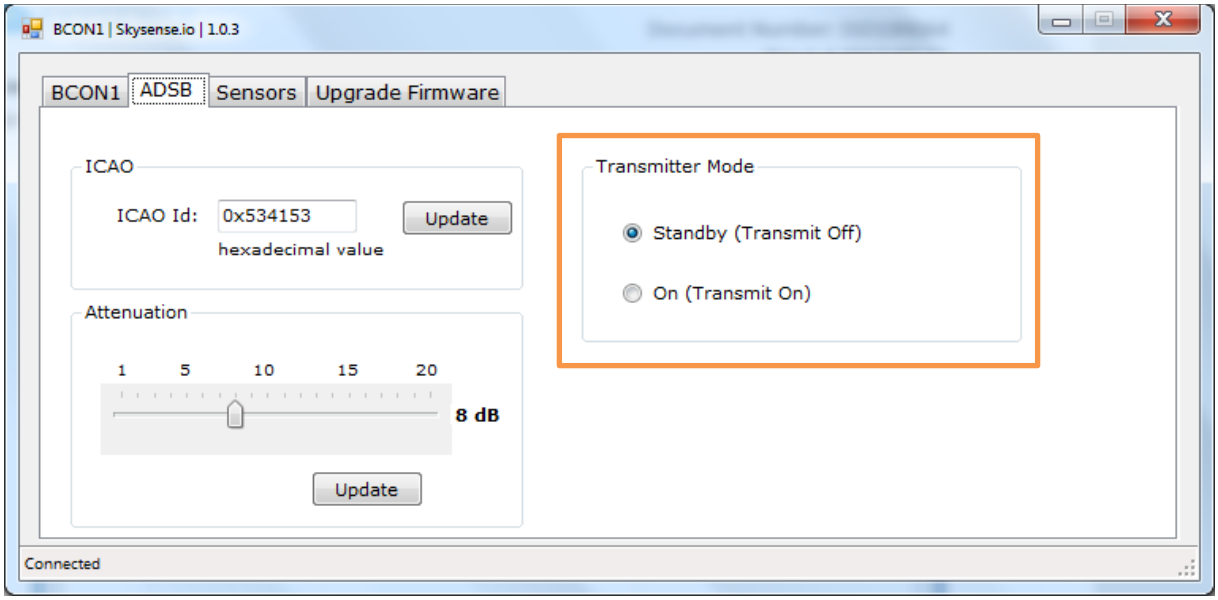
Go to **ADSB** tab, and then change the transmitter mode to **Standby**.

Select the new attenuation value and press the **Update** button**.**



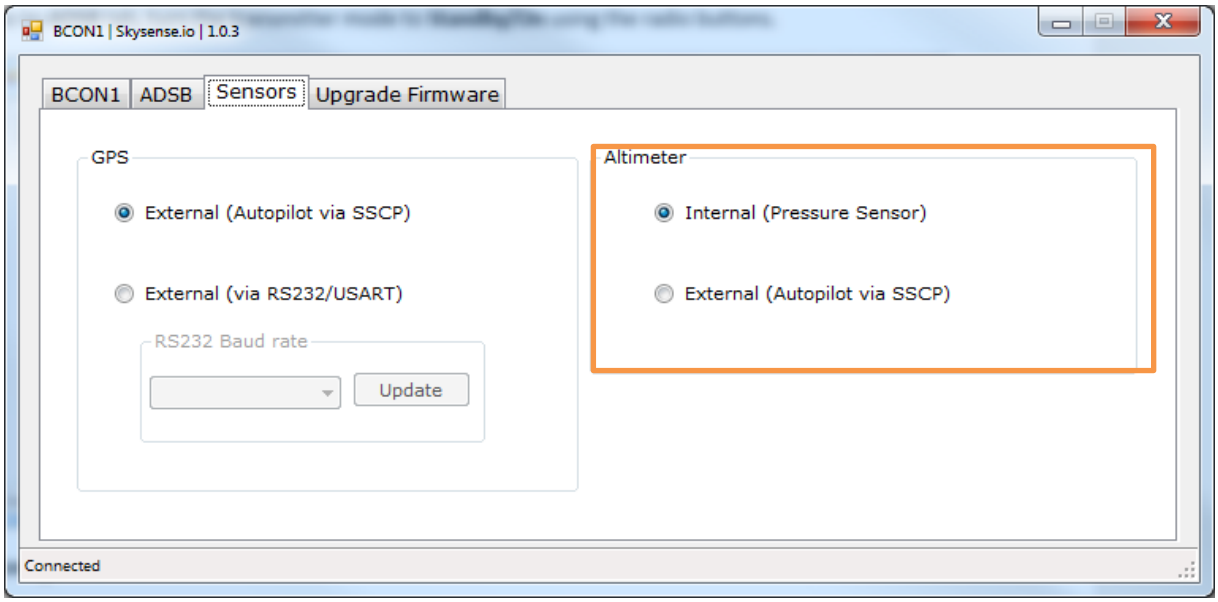
Toggle Transmit Mode

Go to **ADSB** tab, turn the transmitter mode to **Standby/On** using the radio buttons.



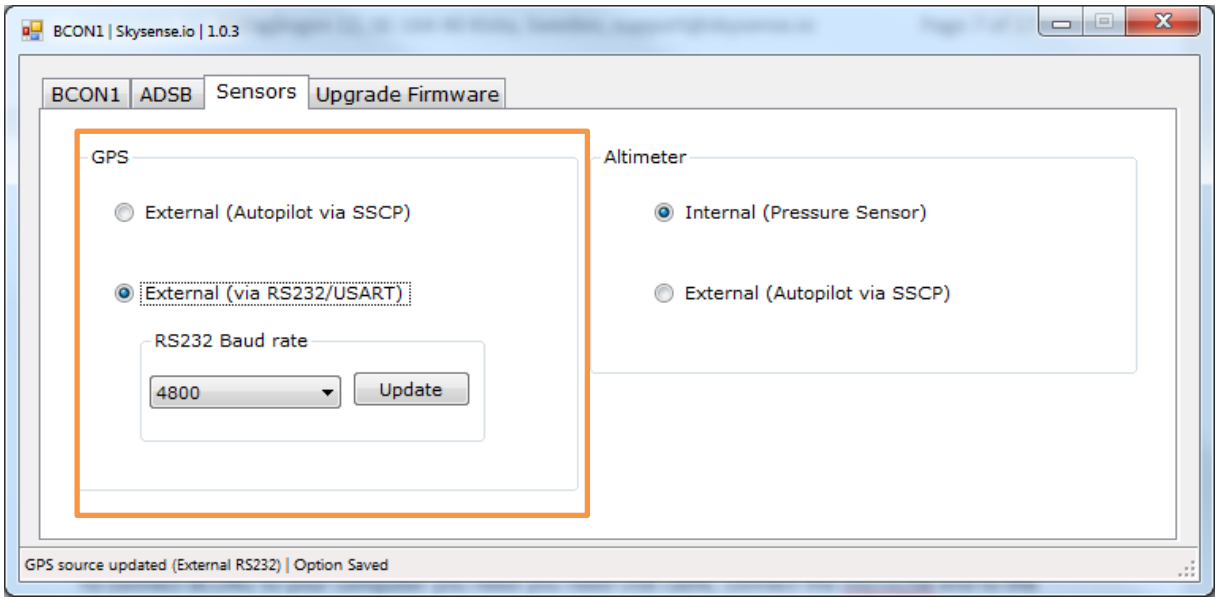
Configure Altimeter source

Go to **Sensors** tab, select the altimeter source **Internal/External** for altitude data.

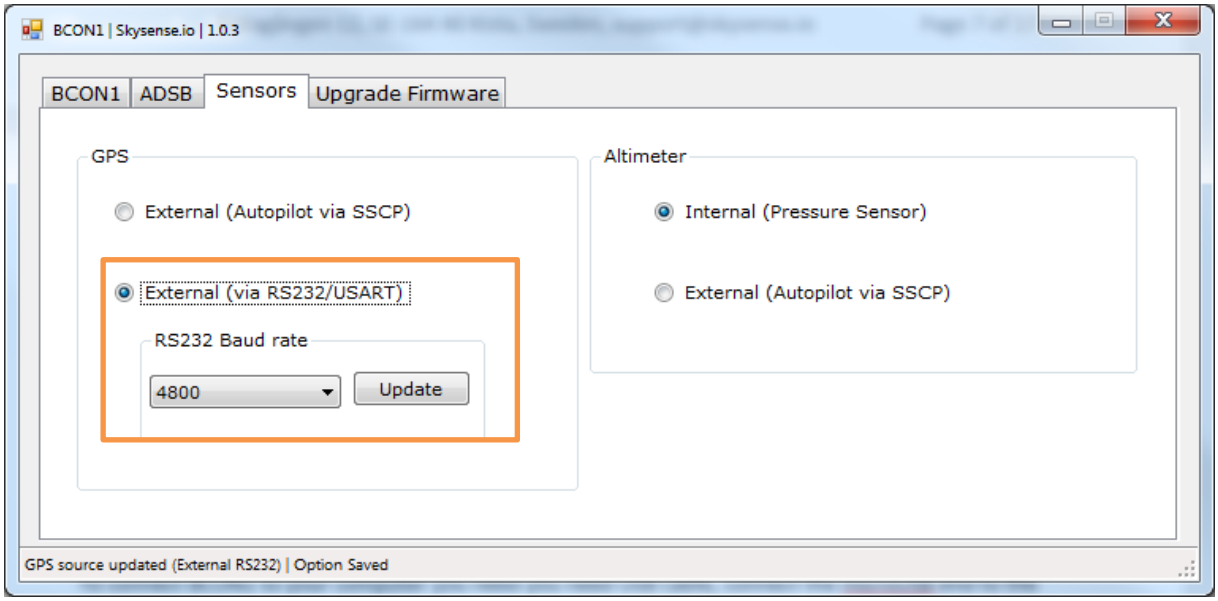


Configure GPS source

Go to **Sensors** tab, select the **GPS** source Internal/External.



RS232 baud rate section is enabled when the GPS source is set to **External (via RS232)**.
To change the baud rate, select the appropriate value from the drop down list and press the **Update** button.



Setup via Terminal

To connect BCON1 to your computer you need you need USB cable, connect the microUSB end to the BCON1 and the standard USB end to the PC/Laptop. If the BCON1 is properly connected the PC will detect new hardware as **CDC Virtual COM**, this COM port enables RS232 communication via USB cable. Follow the instructions in Appendix C to install the device drivers.

Then open terminal application and setup serial port with below configuration:

- Baud rate: 115200
- Data: 8 bit
- Parity: None
- Stop: 1 bit
- Flow control: None

Verify the connection by typing **AT** in the terminal window, BCON1 will return in response the product id and acknowledgment.

```
at
BCON1
OK
```

Configure ICAO Id

Enter the new ICAO Id in hexadecimal by using the **icao** command in the terminal window, BCON1 will return in response the acknowledgment.

```
icao 534153
OK
```

You won't be allowed to change the ICAO Id when the transmitter mode is set to **On**.

Toggle Transmit Mode

Turn off the transmission using **txs** command and then set the new ICAO id, at the end turn on the transmission using **txo** command.

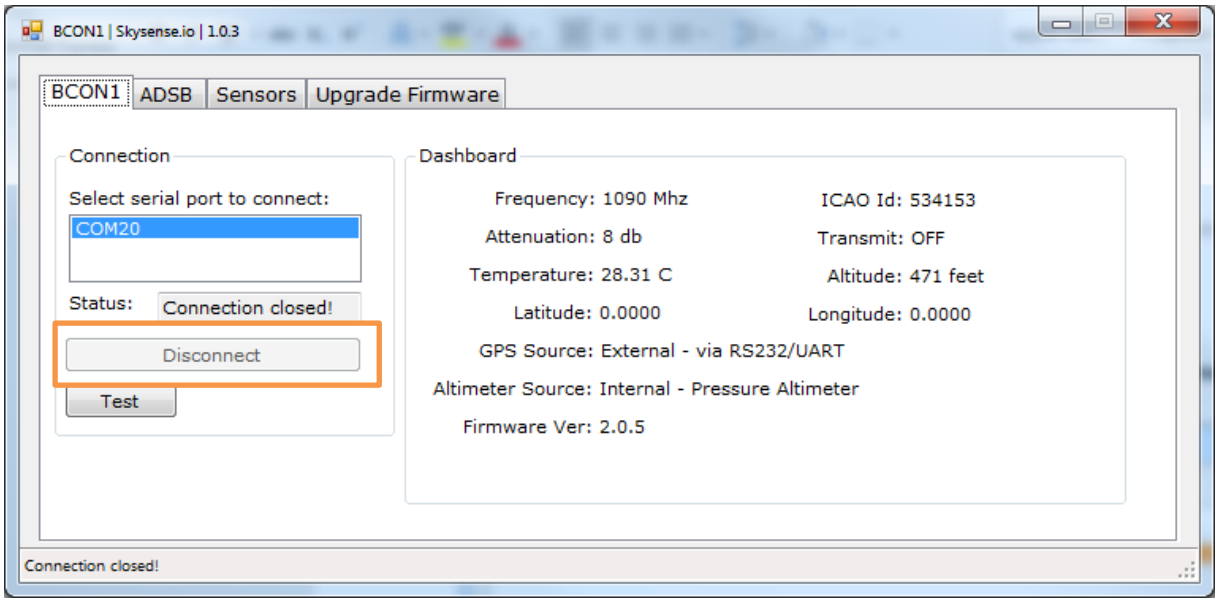
```
txs
OK

icao 534153
OK

txo
OK

eps
New Values saved to EEPROM.
```

See Appendix B, for full list of CLI commands supported by BCON1.

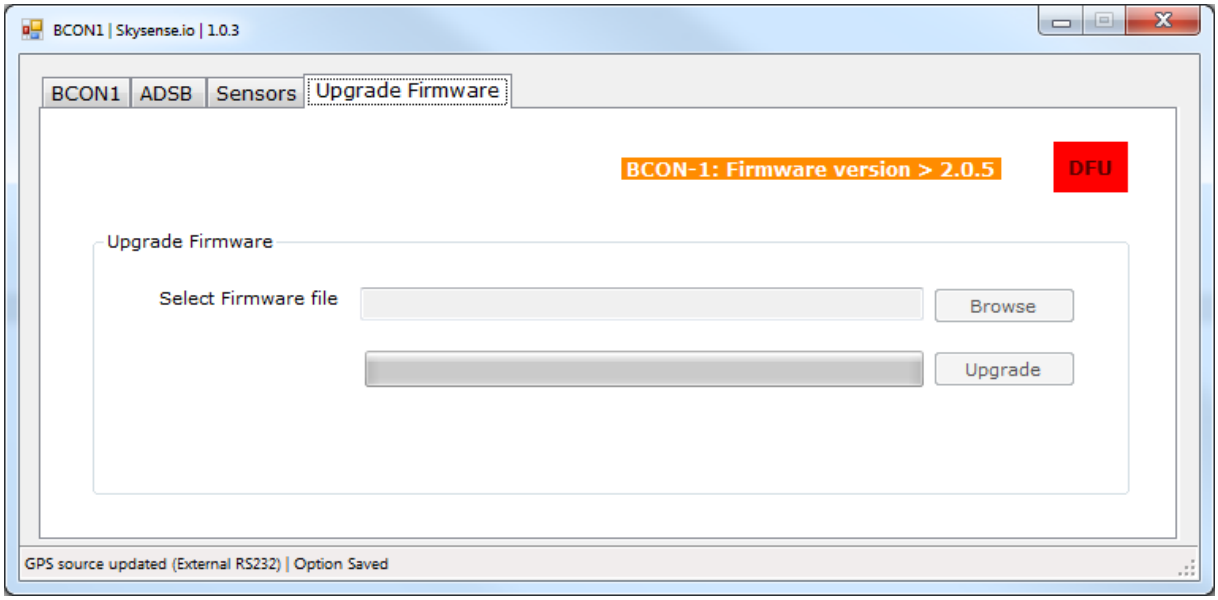
Upgrade Firmware

To perform firmware upgrade, connect the BCON1 to your computer using USB cable.
Connect the microUSB end to the BCON1 and the standard USB end to the PC.

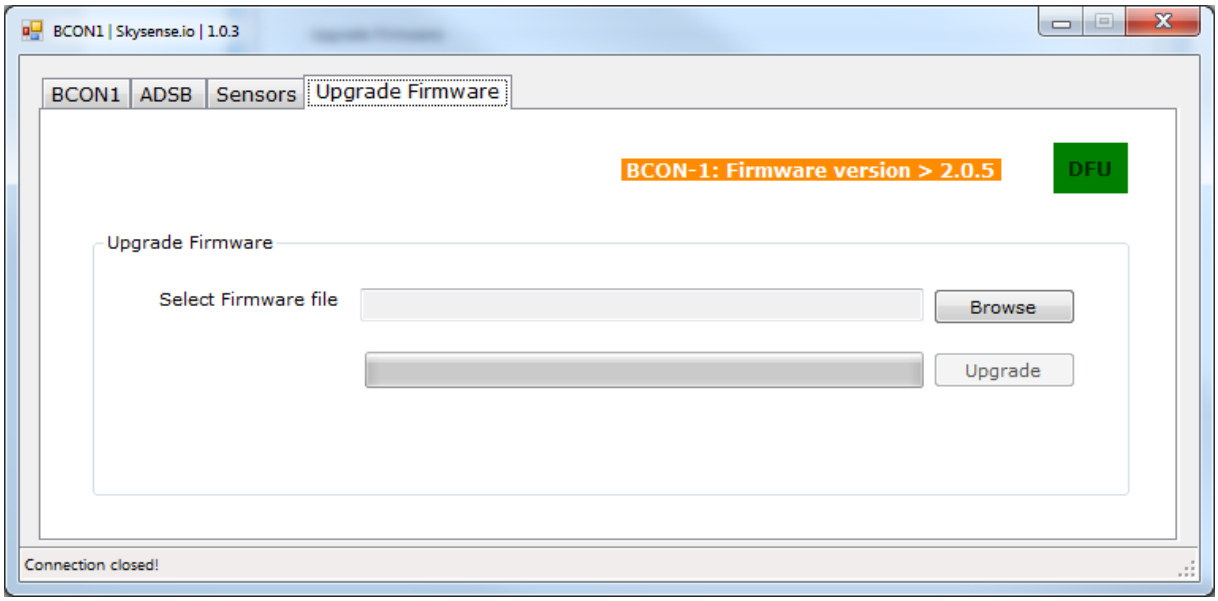
Open BCON1 client and if it is already open press the **Disconnect** button on **BCON1** tab.



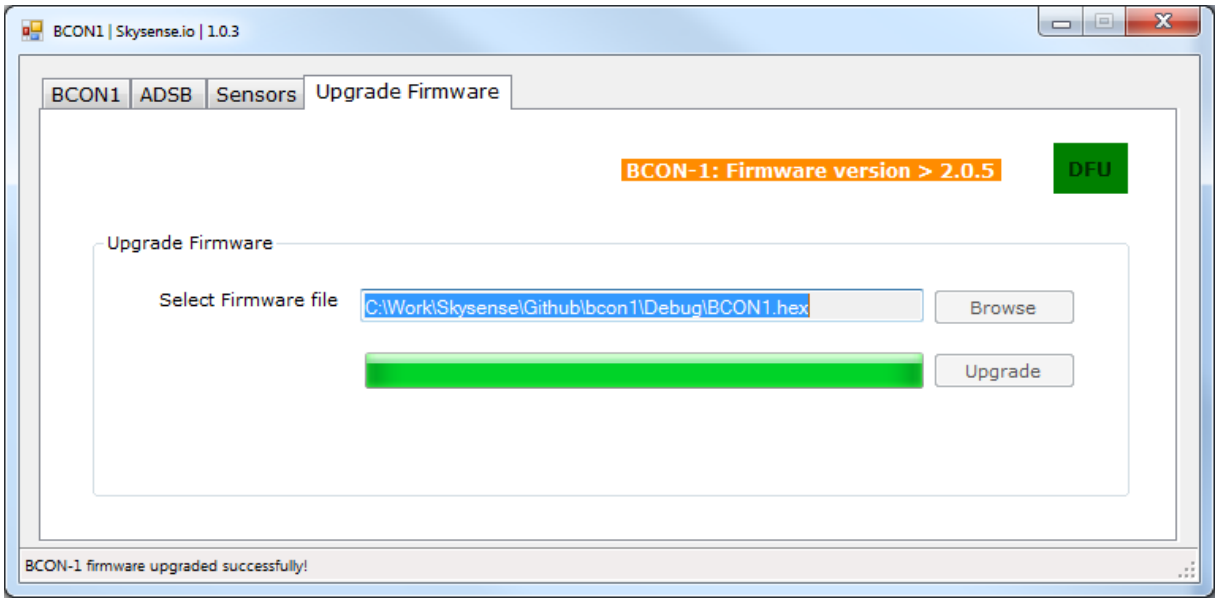
Select the **Upgrade Firmware** tab.
On the BCON1 **Press & Hold down** the **DFU Switch** and perform power cycle, BCON1 now should only gave solid RED LED.

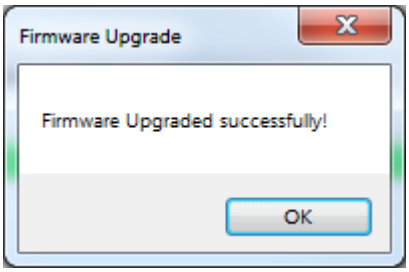


DFU label with green background indicates that the BCON1 is in Device firmware update (DFU) mode.

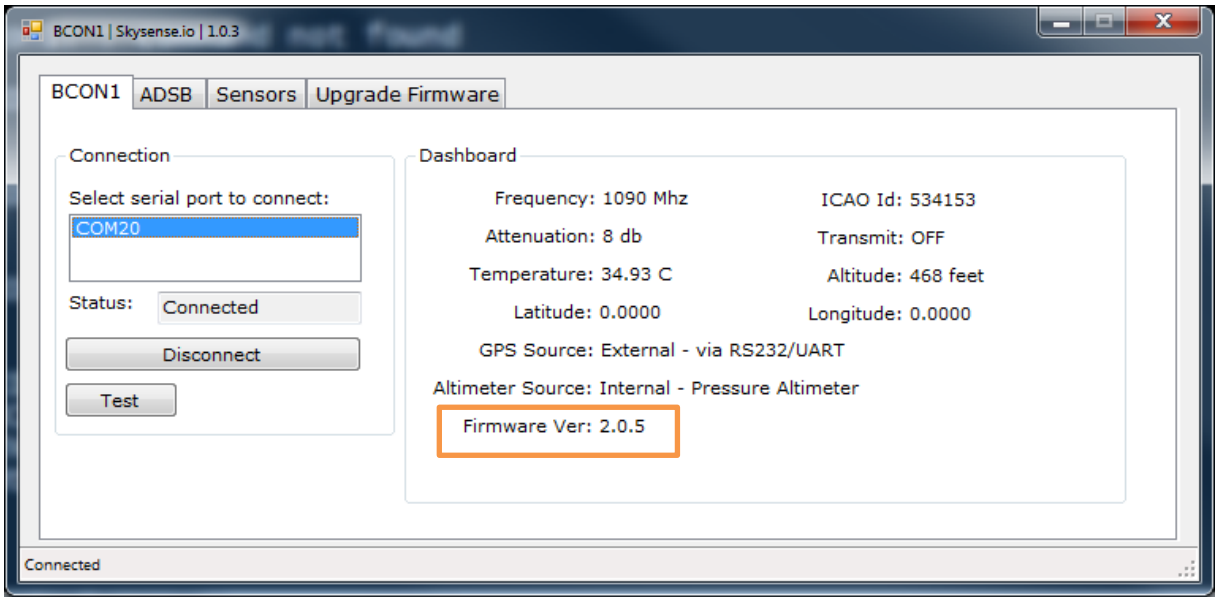


Browse the new firmware hex file (BCON1.hex) and click the **Upgrade** button.





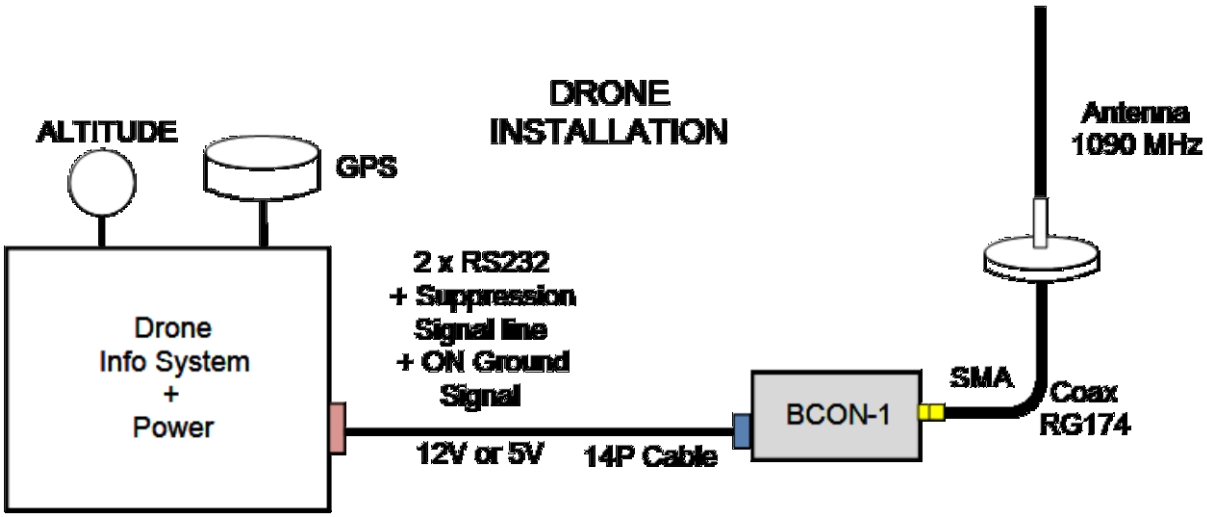
Goto **BCON1** tab and connect to the BCON1 transmitter and verify the firmware version on the dashboard.



Connect BCON1 to your drone

Hardware Interfaces

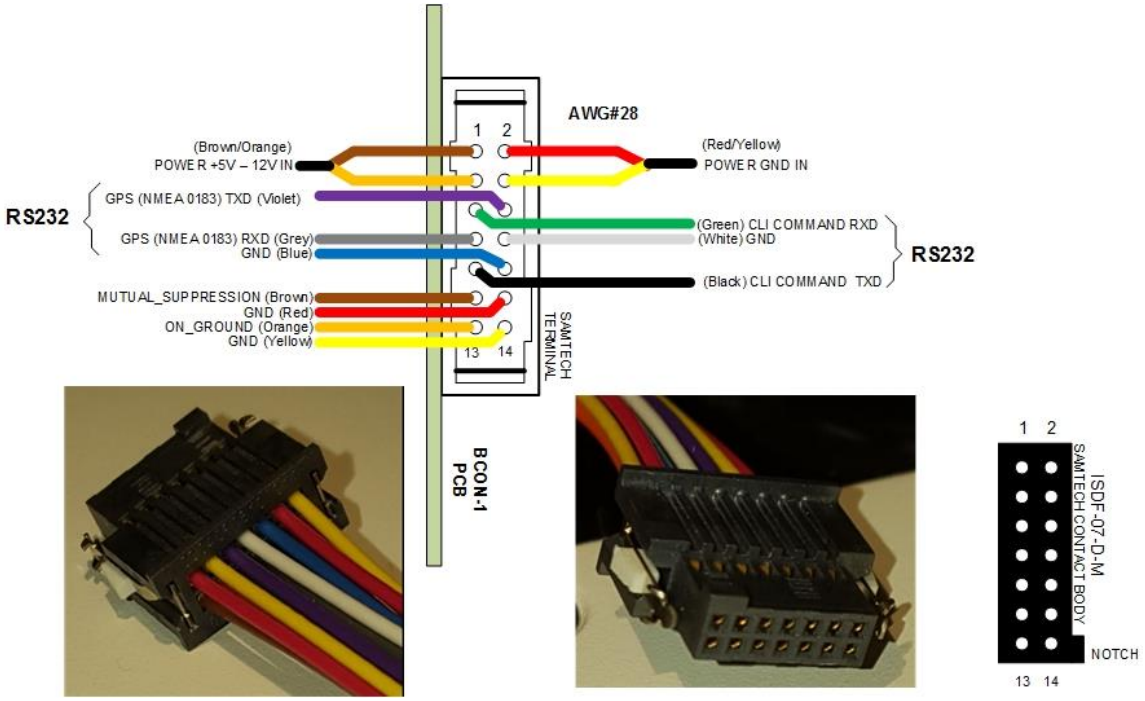
To use BCON1 with your drone, you need the SAMTECH cable harness, a single-ended 14 pole SAMTECH connector. The other end of the SAMTECH cable harness must be adapted depending on the physical interface of the autopilot. Note that it is possible to connect BCON1 to a GPS source if GPS data cannot be retrieved via autopilot. The wire size is AWG #28 and appropriate tools are recommended. See Appendix A for a complete pin map of the SAMTECH connector. One of the RS232 interface can be used to control the BCON1 transmitter from the autopilot using Command line interface or Skysense proprietary communication protocol.



Command and Control Interface

The BCON1 transmitter can be controlled with a simple and light weight proprietary communication protocol or command line commands via a serial interface (RS232). If you want to integrate your UAV flight computer or autopilot, please contact Skysense AB for the SSCP specification document. See appendix B for CLI commands.

Appendix A: Pin Map of SAMTECH Connector



Appendix B: CLI Commands

BCON1 supports below Command Line Interface Commands over serial interface RS232 via Cable harness or USB cable.

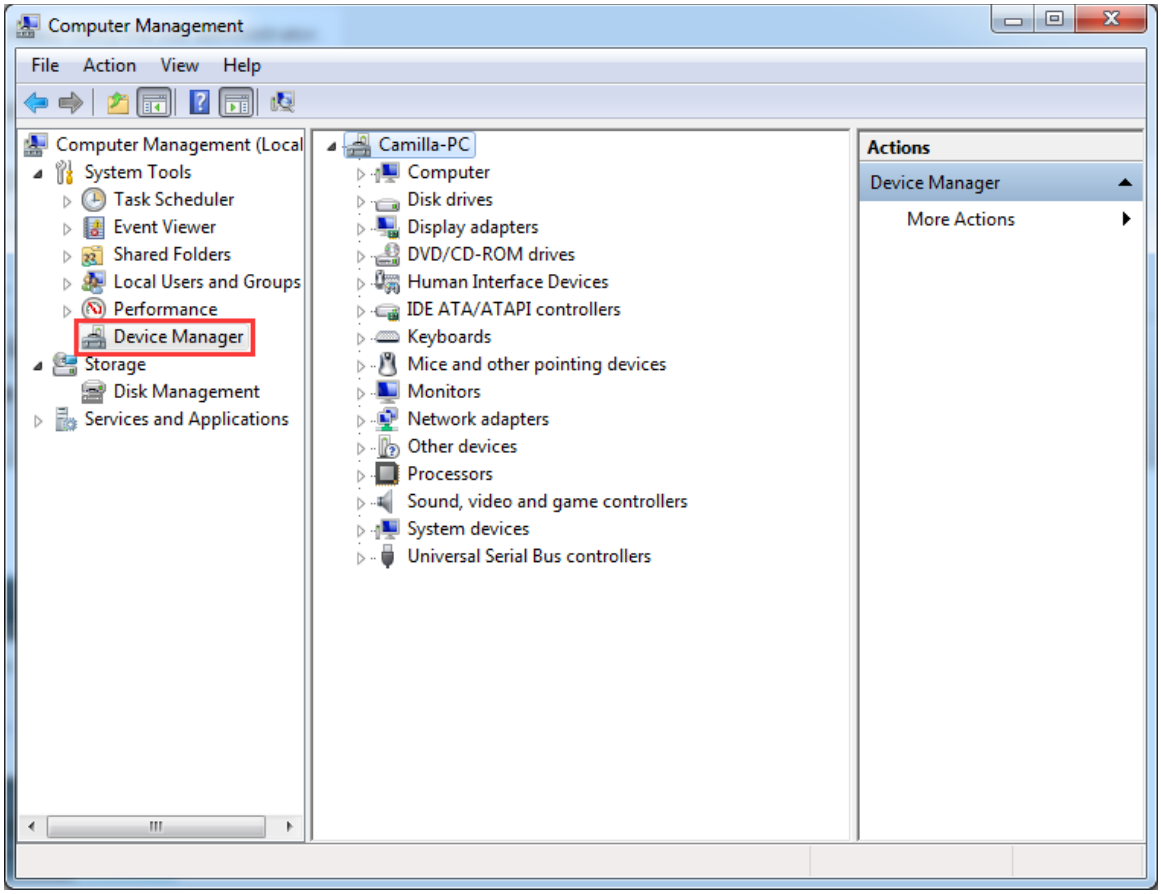
Connect BCON1 to your computer and follow the instructions mentioned in section “Setup via Terminal”

Command	Description
at	Display Product name
ver	Display firmware version
txo	Turn off Mutual suppression i.e Transmit On
txs	Turn On Mutual suppression i.e Transmit Off
icao <hex value>	Set ICAO Id
att <dec value>	Set Attenuation value
gpbr <dec value>	Set baud rate for the RS232 port, used for external GPS
gps	Display GPS Information, e.g. Latitude, longitude
gps_exu	Set GPS source to external GPS i.e via USART
gps_exs	Set GPS source to external i.e Autopilot via SSCP
alt	Display Altitude information in Foot
alt_ext	Set Altimeter source to external i.e Autopilot via SSCP
alt_int	Set Altimeter source to internal
temp	Display BCON1 temperature in Celsius
set ita	Display Transmit Status, ICAO Id, Attenuation value
set br	Display baud rates for CLI, GPS
set ga	Display GPS. Altimeter sources (External\Internal)
eps	Save values to non-volatile memory i.e EEPROM
sscp	Switch to SSCP mode (Not available via USB)

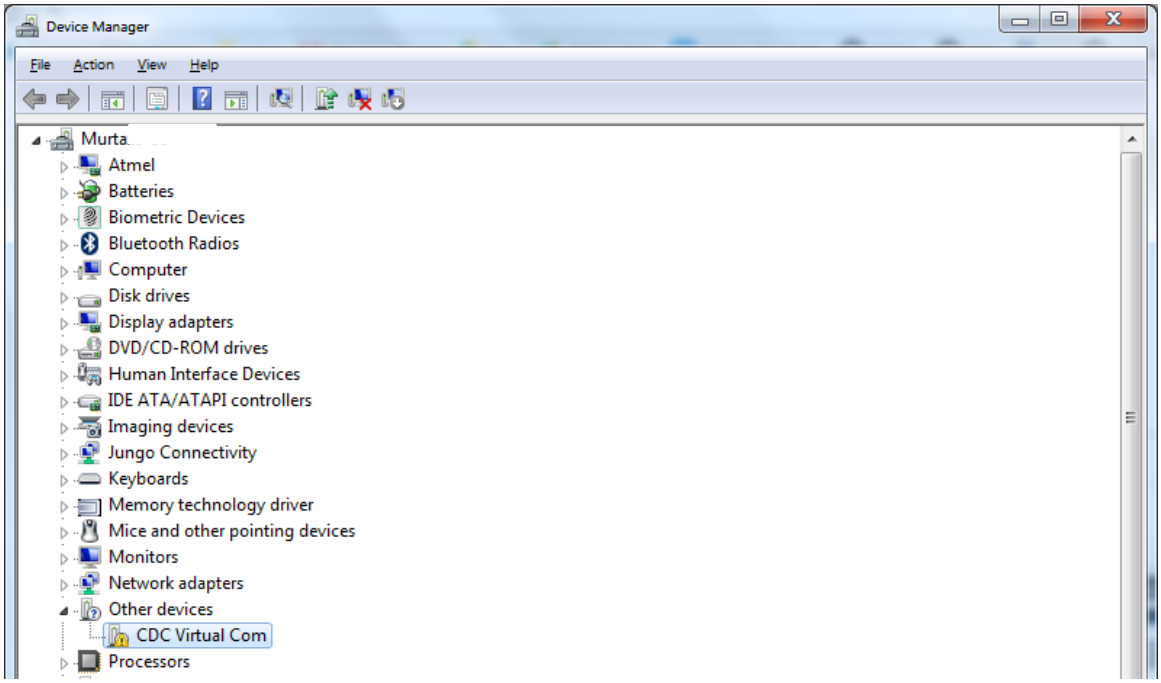
Appendix C: CDC Virtual COM Drivers

To install driver in Windows 7, follow these steps:

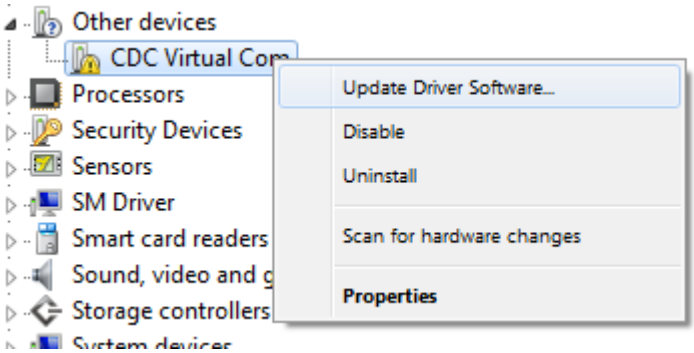
1. Download the drivers from the below public repository, extract the compressed file to a temp directory.
   https://github.com/Skysense-io/tools/tree/master/cdc-virtual-com-drivers
2. Click **Start** menu and right-click on **Computer**.
3. Click **Manage**.
4. Click **Device Manager** in left pane.



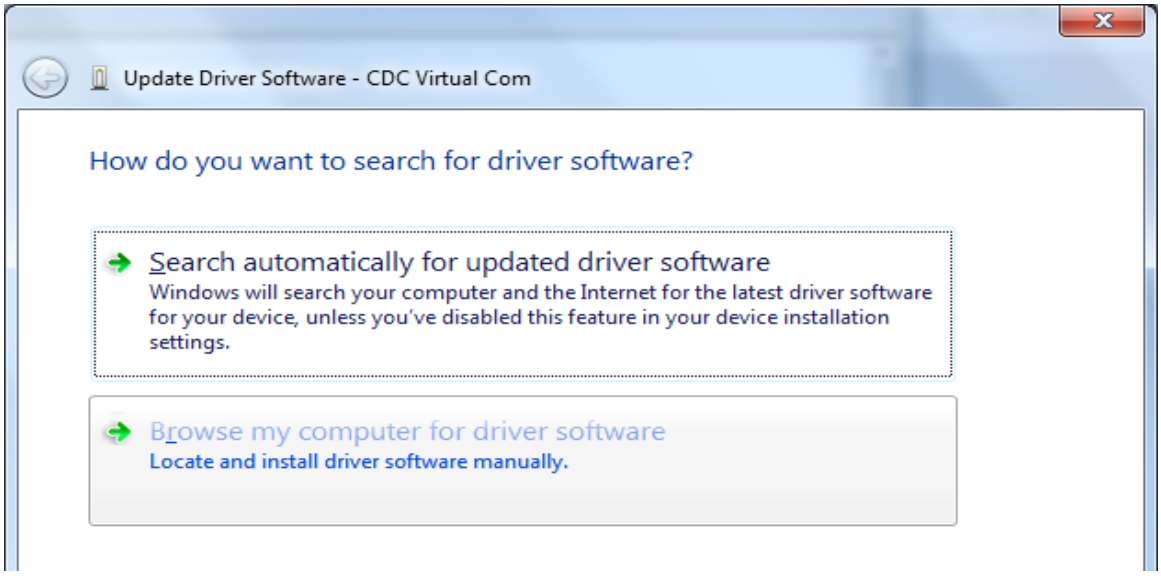
5. Select **Other devices** and then **CDC Virtual Com.**



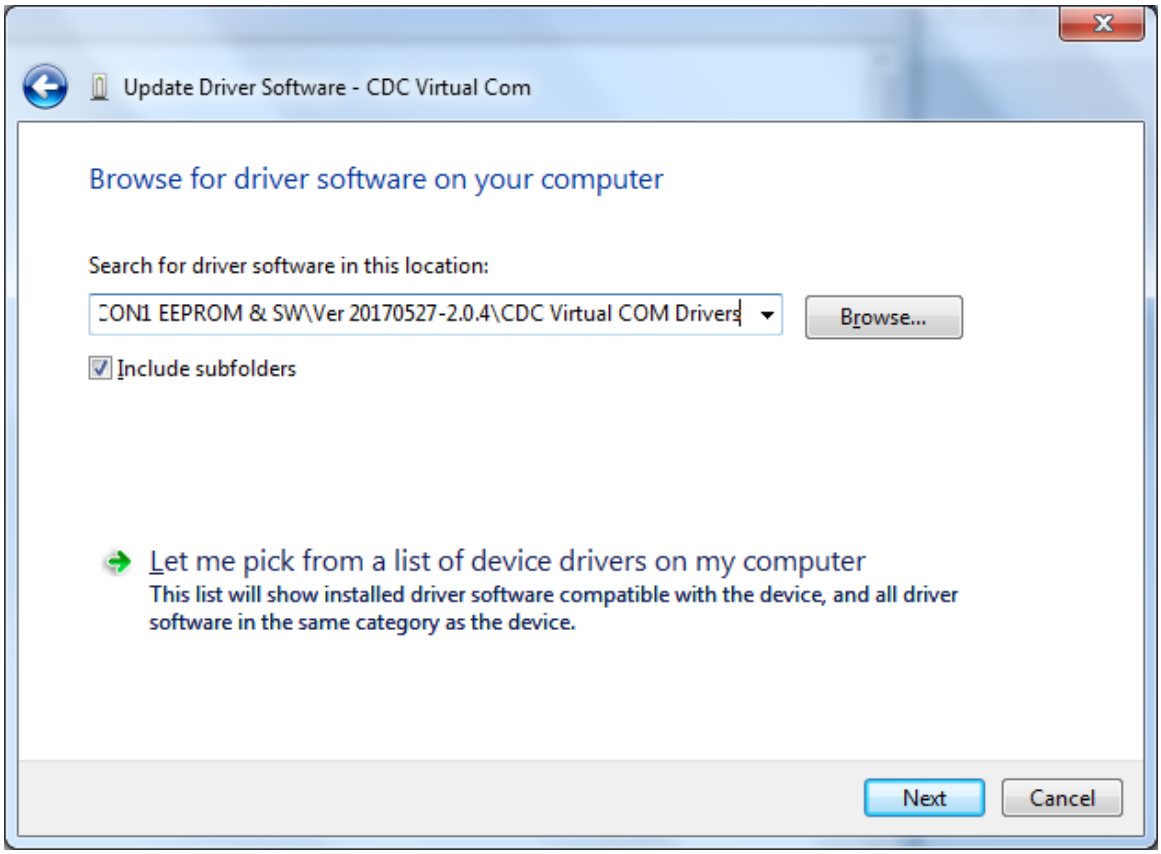
6. Right-click on the **CDC Virtual Com** and select **Update Driver Software.**



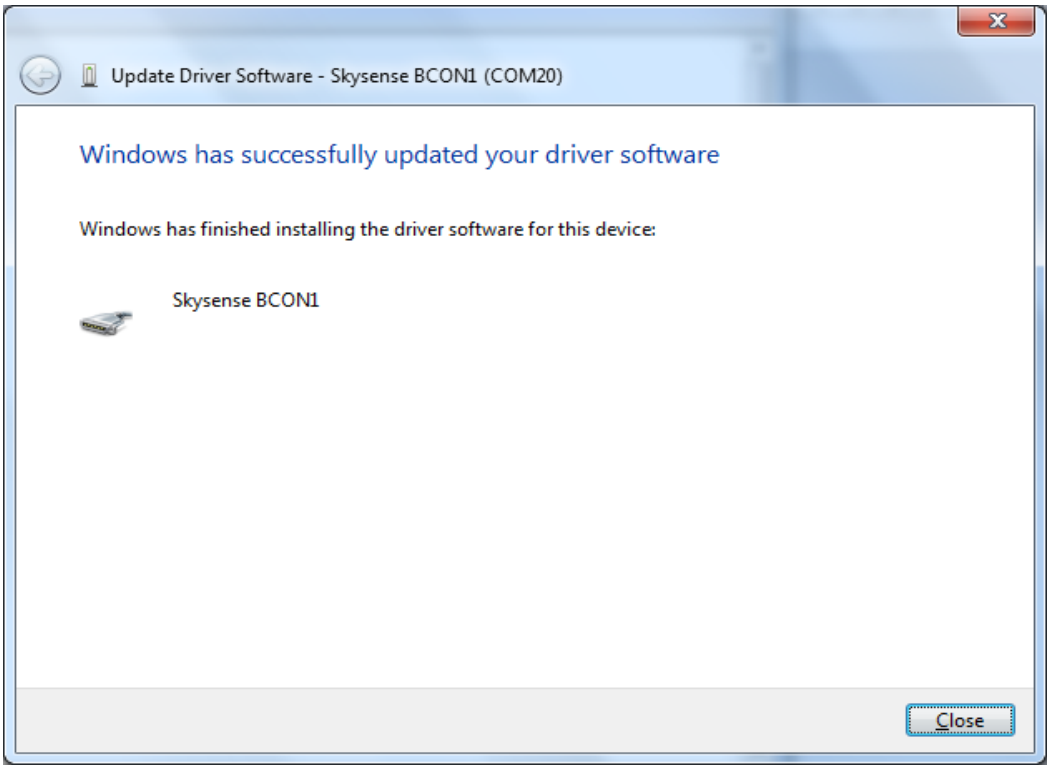
7. Click **Browse my Computer for driver software**.



8. Click on **Browse** to find the location of the downloaded driver file



9. Click on **Next** button to install the driver.



10. Open **Device Manager** to verify that the drivers are installed successfully.