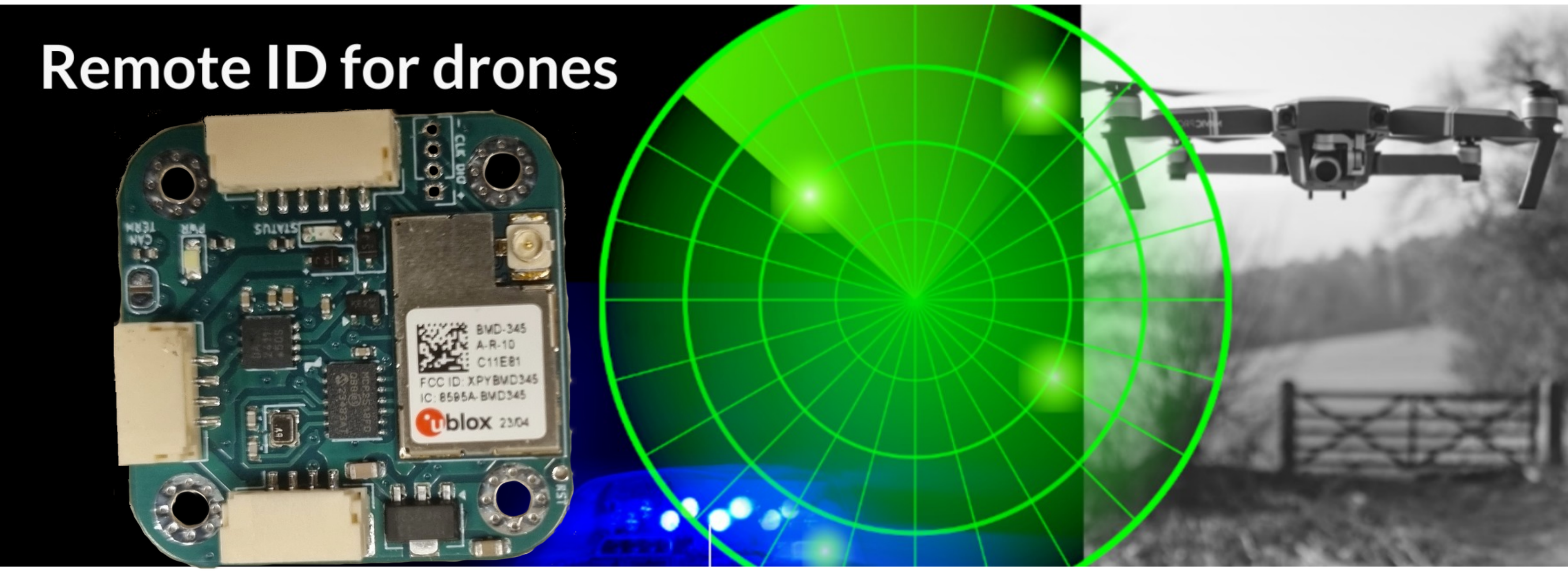
DroneBeacon db300 Blue UAS MAVLink/DroneCAN Transponder Manual

January 2026 - version 1.1



The latest version of this manual is located here:
https://download.bluemark.io/db300.pdf

Intended audience: users of the db300 transmitter module

Disclaimer: we are not responsible or liable for errors or incomplete information in this document.

Version history

version	date	description
1.0	November 2025	Initial release
1.1	January 2026	Added features of firmware release 1.1 in manual

QUICK START

1. The db300 is a drop-in replacement of the db201 module. In most cases you only need to swap the module to the db300.

2. Connect the antenna to the IPEX antenna connector of the radio module. (This is already done for the included antenna.

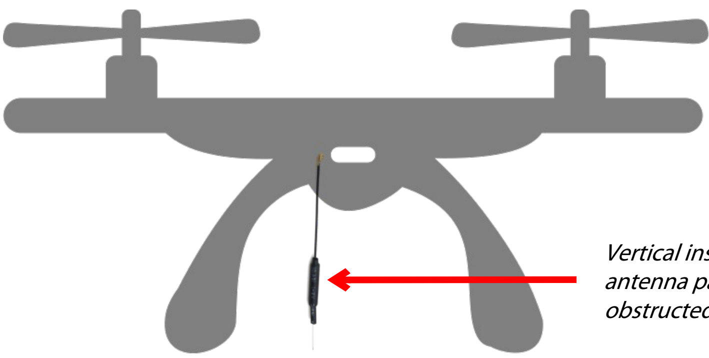
3. Install the db300 transmitter module to the drone chassis using 4x M2 screws or cable ties.

4. Install the antenna vertical (+/- 15 degrees) to make sure the antenna pattern is omni-directional and the Remote ID signals can be received from each direction. Also make sure that the last part of the antenna (where it gets thicker) is not obstructed by metal objects that could block radio reception in that direction.

5. Install the db300 radio module to the auto pilot system:
   a) DroneCAN: Attach the db300 module via *CAN 1* or *CAN 2* to a free *CAN* port of the flight controller using a 4-pin JST-GH 1.25mm cable.
   b) MAVLink attach the db300 module via the *TELEM* port to a free *TELEM* port of the flight controller using a 6-pin JST-GH 1.25mm cable.

6. Turn the flight controller on. A white LED on the module should be ON. It means the db300 module has power. In addition, there is a red status LED. It will flash slowly if the module detects an RemoteID errors. It will flash fast in firmware upgrade mode.

7. Configure Remote ID in the auto pilot system. For ArduPilot see this page: https://ardupilot.org/dev/docs/opendroneid.html#opendroneid



Vertical installation. Thick antenna part should not be obstructed by metal objects

Flying a drone could create risks for people, air traffic and other assets. Before flying, the drone operator has to make sure to know the local rules regarding drone flights and obtain the necessary authorization to fly the drone(s).

Contents

1 INTRODUCTION

Thank you for purchasing and using DroneBeacon products!

The latest version of this user manual can be downloaded at the following link, where the most up-to-date version is located:
https://download.bluemark.io/db300.pdf

(Direct/Broadcast) Remote Identification (Remote ID) adds "beacon" capability to drones to broadcast basic information of airborne drones, such as the operator's registration number, drone serial number and current position. The EU, USA, Japan and other regions plan or have rules that make Remote ID mandatory for drones over 250 grams weight. The beacon information can be used by general public, law enforcement and drones to give better situation awareness of the airspace around them.

BlueMark Innovations BV offers Remote ID transmitter modules and receivers solutions. DroneBeacon products are RemoteID transmitter product such as the db120 or db300 product. DroneScout is a receiver that detects Remote ID signals of nearby drones up to several km distance (in open space). See https://dronescout.co for more information about our products. We also offer an receiver add-on called DroneScout Bridge https://dronescout.co/bridge/ for smartphones and our the DroneScout pro app (iOS/Android) https://dronescout.co/app

There are two Remote ID categories defined by the FAA (USA): a) standard Remote ID and b) Remote ID broadcast module. https://www.faa.gov/uas/getting_started/remote_id/drone_pilots
In other regions (Japan, EU) these categories do not exist, there is only one (Direct/Broadcast) Remote ID category. In the EU there exists also network Remote ID. In this category, Remote ID information is sent via a mobile internet connection to a portal. Network Remote ID is only mandatory in specific cases such as U-Space defined areas. (U-space is to drones what traditional air traffic control is to airplanes.)

This first Remote ID category (standard Remote ID) allows BVLOS (Beyond Visual Line of Sight) flights and is integrated into the auto pilot system (such as ArduPilot. PX4) and GCS (Ground Control Station) like QGC (QGroundControl). The GCS software allows you to monitor the RemoteID status and you will get a warning if it fails. The other category (Remote ID broadcast module)is a stand-alone product without interaction with the drone. Currently we offer several products in this category: db120 (with battery), db151pcb (PCB version without battery), db152fpv/db153fpv (place between GPS receiver and auto pilot system).

At the moment BlueMark offers different standard Remote ID modules that interface via MAVLink or DroneCAN to the autopilot system:

- **db300 blue UAS** – a **blue UAS** ready RemoteID module using the u-blox BMD-345 module with a Nordic nRF52 radio module. The firmware is proprietary but its behavior is similar to ArduRemoteID firmware. For most users it is a blue UAS drop-in replacement for the db201 module.
- **db201 –** a module with DroneCAN 2x and xMAVLink interface
- **db202mav** - cost effective module with only 1 MAVLink interface
- **db203can** - cost effective module with only 1 DroneCAN interface
- **db210pro** - pro version with a ESP32-S3 module and IO rich

1.1 Blue UAS and NDAA compliance

The db300 standard RemoteID transmitter module is a drop-in replacement for the db201 transmitter module. It is based on the u-blox BMD-345 radio module with Nordic nRF52840 Bluetooth radio with external power amplifier for high transmission power.

NDAA compliance
All our standard RemoteID modules are NDAA compliant (Section 889 of the National Defense Authorization Act (NDAA). This means the db201, db202mav, db203can, db210pro and db300 are NDAA compliant.

Blue UAS
The U.S. Department of Defense/War has developed additional drone requirements called the **Blue UAS** program. This program targets drones for government use, ensuring they meet strict security and operational standards. The db300 complies with the **Blue UAS** requirements. It is **Blue UAS** *ready*, because only DoD/DoW can approve components or drones.

1.2 Audience

This document is intended for users that want to use the *DroneBeacon MAVLink db300 transmitter module* that can be integrated into drone products. It is designed for UAS manufacturers that want to have a standard Remote ID solution.

1.3 Specifications

The transponder consists of an embedded system and several radio-interfaces to broadcast Remote ID signals.

Key specifications:

- RemoteID transmission protocols
  - Bluetooth dual-mode (legacy + Long Range)
- FCC/CE certified radio module
  - u-blox BMD-345
  - Nordic nRF52840 radio
  - External PA 24 dB
  - FCC ID: XPYBMD345
- Transmit frequency:
  - 2.4 GHz
- Transmit power
  - +16 dBm (+8 to +32 dBm)
  - recommended FCC max power setting: +16 dBm
  - recommended CE (RED max power setting: +8 dBm
- Antenna: 3 dBi omni-directional antenna with IPEX connector (included). Can be replaced with your other antennas if it is compliant with FCC/CE and RemoteID regulation.
- *Compliant with international regulation*
  - EU ASD-STAN DIN EN 4709-002
  - USA ASTM Remote ID Standard ASTM F3411-22a-RID-B/ F3586-22

- FAA ready[1]
- RemoteID messages
  - “dumb” transmitter module that receives RemoteID packets (“OPEN_DRONE_ID_*”) from flight controller using the MAVLink/DroneCAN interface: BasicID, Location, OperatorID, System, SelfID and Auth messages.
  - Broadcast this information as a Bluetooth dual-mode packets
  - mimics ArduRemoteID open-source firmware
  - Send a 1-Hz ARM Status(OPEN_DRONE_ID_ARM_STATUS) back to the flight controller
  - BasicID data can be permanently saved in the db300.
- Connectivity:
  - 2x JST GH 4-pin CAN (DroneCAN) port
    - CAN 2.0 (1 Mbps) / CAN FD[2] (up to 8 Mbps)
    - 120 ohm termination: solder pad
  - 1x JST GH 6-pin TELEM (UART/MAVLink) port
    - 57600 baud rate (default)
- Firmware upgrade:
  - SWD header / Bluetooth
  - secure boot/signed firmware
- Power: +5V supplied from TELEM or CAN port
- LED lights: power (white) and status LED (red)
- Security: secure boot & signed firmware
- Fastening mechanism: 4x M2 screws (20 x 20 mm grid)
- Size: 27.5 x 27.5 x 5 mm
- Weight: 2.5 g (excluding antenna)
- Operating temperature: -40°C to +125°C

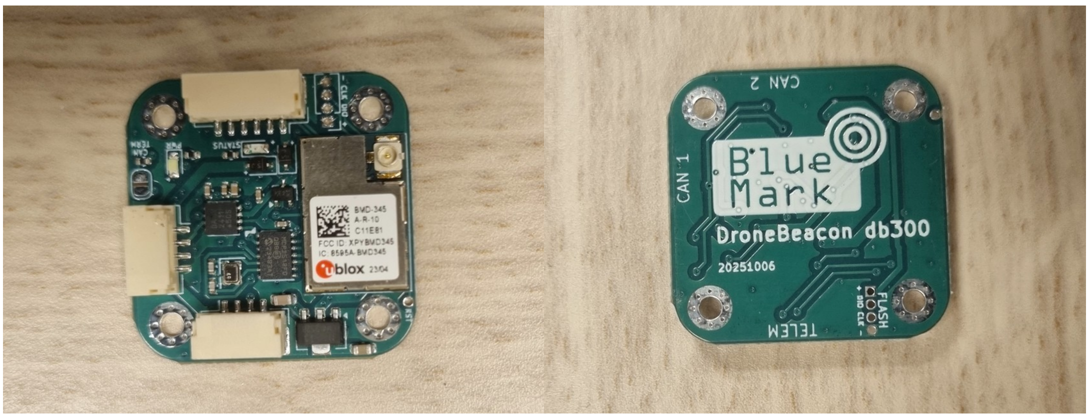


Figure 1 - DroneBeacon db300 transponder

[1]We can help business customers in our BlueMark Partner program https://bluemark.io/drone-remote-id-partner-program/ to submit a Declaration of Compliance (DoC).

[2] Supported by the hardware. No support in initial firmware.

1.4 DroneCAN/MAVlink interface

The db300 uses a similar DroneCAN/MAVLink pin-layout as most flight-controllers. It shown for reference in the figures below.

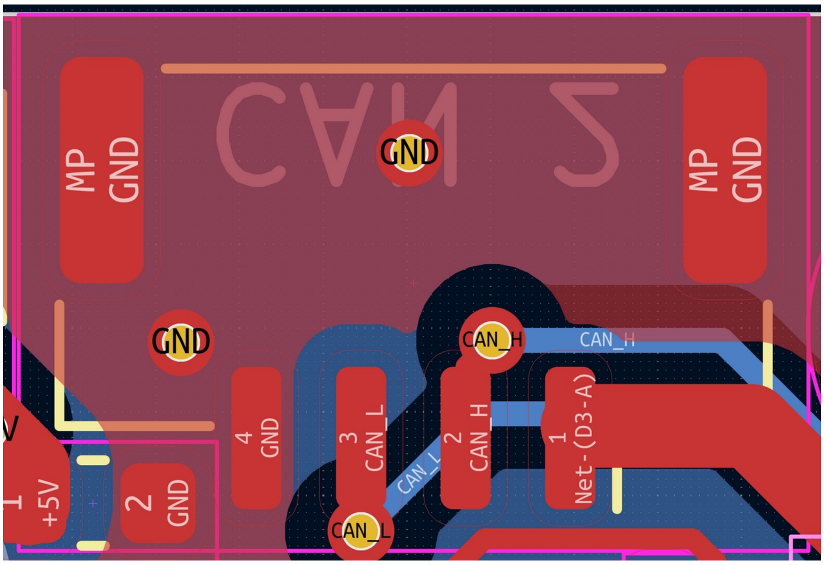


Figure 2 – DroneCAN interface of the db300

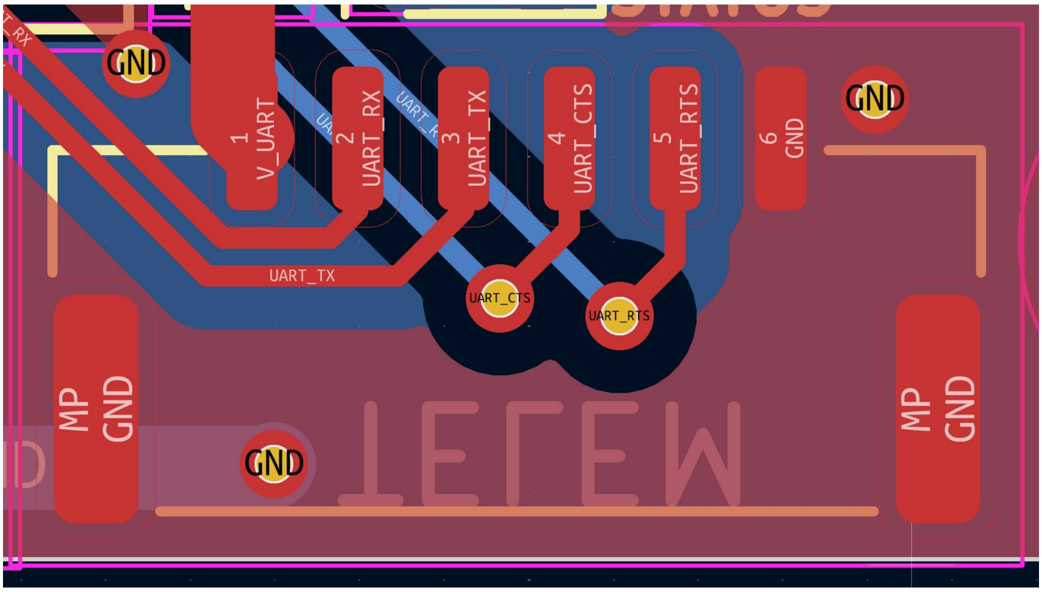


Figure 3 – MAVLink interface of the db300

1.5 Antenna

A 3 dBi omni-directional antenna with IPEX connector is included with each db300 module. You can use your own antenna. In that case, make sure that you are still compliant with FCC/CE regulation. This means that if you use an antenna with a gain higher as 3 dBi, you need to reduce the transmit output level accordingly, so the effective EIRP does not increase. Also, make sure that the new antenna pattern meets the omni-directional requirements as specified by the ASTM F3586-22 RemoteID regulation. Please contact us for advise/more information.

1.6 Installation

See the quick-start description on page 3 of this document.

1.7 Using the transponder

The db300 transmitter module is a “dumb” RemoteID transmitter module. All RemoteID information needs to be streamed to the module by the flight controller. (BasicID information can be configured/stored in the db300.) For normal operation, make sure the transponder is powered on (white power LED is ON) and make sure the module can communicate with the autopilot system. **In normal operation, the red status LED is OFF.** ON (slowly flashing) means that there is an error.

Ardupilot
Ardupilot has support for Remote ID in version 4.x and newer. See this link for more information:
https://ardupilot.org/dev/docs/opendroneid.html#opendroneid

PX4
PX4 has support for Remote ID in version PX4 v1.14 and newer. See this link for more information:
https://docs.px4.io/main/en/peripherals/remote_id.html

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1.8 Status LED

The db300 has a red Status LED. It has 3 states:

- off – the received RemoteID data meets the basic compliance checks
- slow blinking – the received RemoteID data has errors such as no GPS fix etc.
- fast blinking – the module is put in Bluetooth firmware upgrade mode

Status codes (as returned to the flight controller in the OPEN_DRONE_ID_ARM_STATUS message https://mavlink.io/en/messages/common.html#OPEN_DRONE_ID_ARM_STATUS):

- 0 – no error
- 1 – transmission disabled (not implemented)
- 2 – no basicID received (or configured in the db300)
- 4 – no operatorID received (not implemented)
- 8 – drone location message is not received in time or there is no GPS fix
- 16 – system message is not received in time or there it has no GPS information.

So for instance status code 10 means that there is no basicID message received and the drone location message is not received in time or has no GPS fix.

1.9 Basic operation

The basic operation of the db300 module is that the flight controller streams the RemoteID data to db300 module. The module receives it and stores it in *volatile* memory. Only the basicID data can be permanently saved/configured in the db300. It will transmit this information using (compliant) Bluetooth legacy and Bluetooth Long Range packets.

The flight controller needs to stream (at minimum) to the db300 module (FAA region):

- BasicID message OPEN_DRONE_ID_BASIC_ID (if it is not saved in the db300 module)
- Location message OPEN_DRONE_ID_LOCATION
- System message OPEN_DRONE_ID_SYSTEM
- OperatorID message is not needed in the USA!

See https://mavlink.io/en/messages/common.html for more information.

The module will stream at 1 Hz a heartbeat message and OPEN_DRONE_ID_ARM_STATUS message to the flight controller. You can configured the db300 using MAVLink or DroneCAN. See Chapter 3 for more information.

1.10 Android/iOS app

You can use our free DroneScout pro app: https://dronescout.co/app/

Note: only few Android smartphones support reception of Bluetooth Long Range and all iOS/iPad do not have support for Bluetooth Long Range at all. You can use our smartphone add-on, called DroneScout bridge to receive those signals: https://dronescout.co/bridge/

1.11 Open Drone ID

The db300 firmware uses internally the Open Drone ID framework to broadcast Remote ID signals. The framework can be found on this page: https://www.opendroneid.org/

2 FIRMWARE

The db300 supports two methods to upgrade the firmware:

- Bluetooth (preferred)
- SWD interface

2.1 Bluetooth

The firmware of the db300 module can be upgrade using Bluetooth and the the free Nordic nRF Connect app (Android/iOS).

1. Install the Nordic nRF app on your phone: https://www.nordicsemi.com/Products/Development-tools/nRF-Connect-for-mobile
2. Download the latest firmware at: https://download.bluemark.io/dronebeacon/db300.bin
   Release notes can be found here: https://download.bluemark.io/db300.txt
3. Put the db300 in firmware upgrade mode:
   - Set the parameter FIRMWARE_UPGRADE to 1 (The module will restart, fetch parameters again to confirm it has been set to 1.)
   - Power the db300, but do not send any RemoteID packets. Wait 15 minutes

   The red LED of the db300 flashes rapidly. This can be disabled in the OPTIONS variable (Chapter 3)
4. Open the Nordic nRF app and scan for nearby devices. (Put your phone within 1 meter distance of the db300.) A device with the name *db300* should be found. Press connect.
5. Press the DFU button, select the firmware file, and press *Test and Confirm*. Note: if the firmware is similar or not-valid, firmware upgrade will fail.

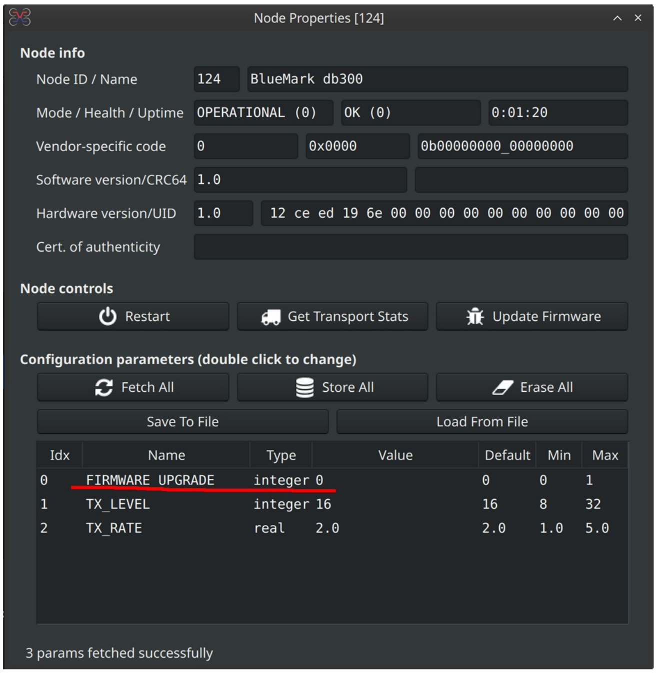
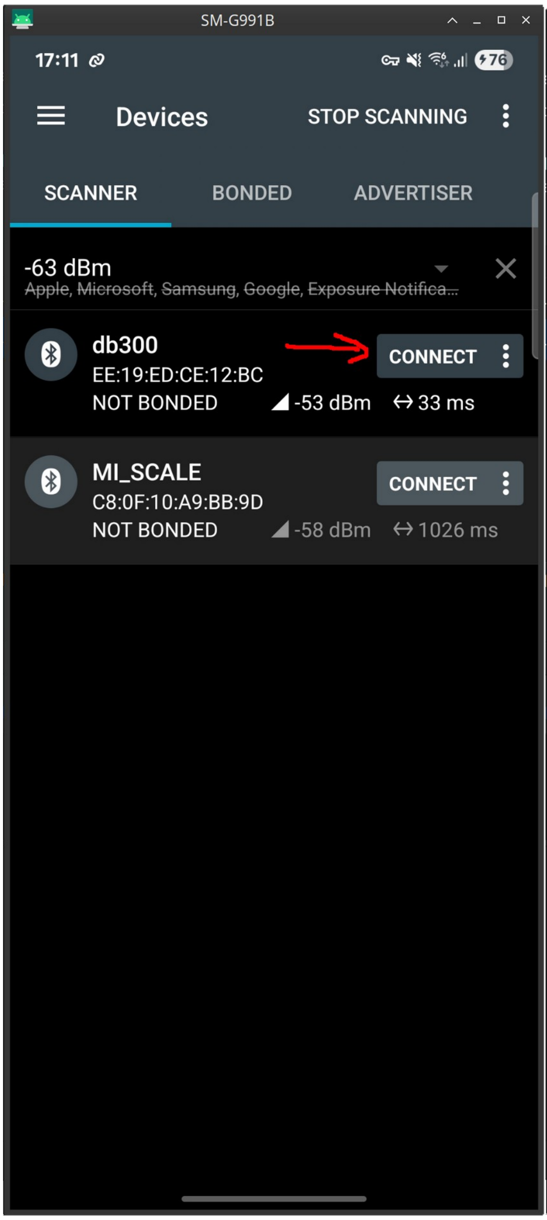
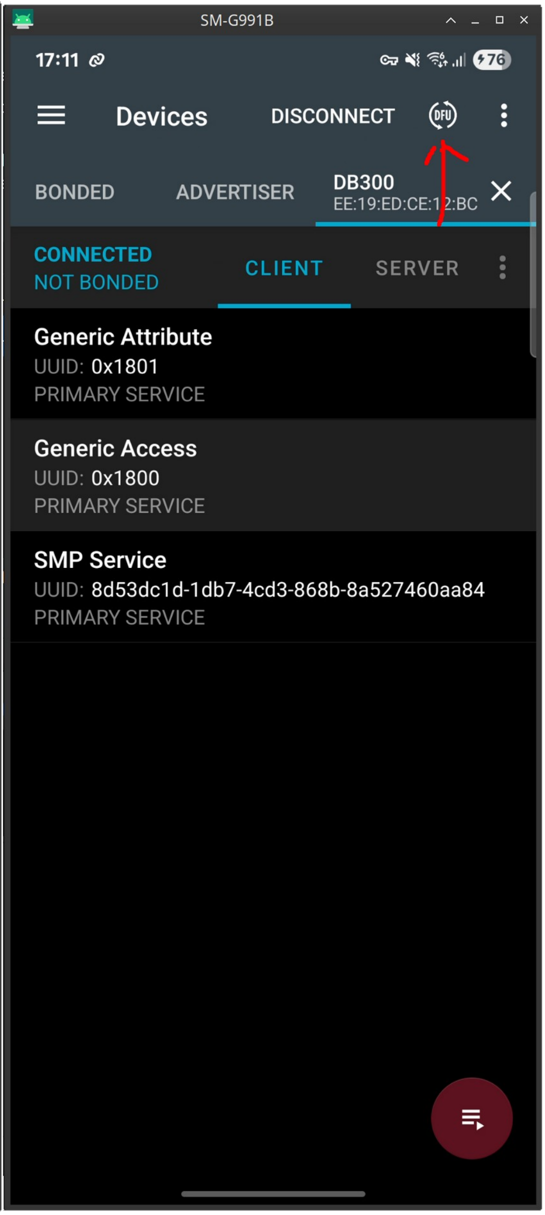


Figure 4 – Set FIRMWARE_UPGRADE to 1.


SM-G991B
17:11
Devices
STOP SCANNING
SCANNER
BONDED
ADVERTISER
-63 dBm
Apple, Microsoft, Samsung, Google, Exposure Notifica...
db300
EE:19:ED:CE:12:BC
NOT BONDED
-53 dBm
33 ms
CONNECT
MI_SCALE
C8:0F:10:A9:BB:9D
NOT BONDED
-58 dBm
1026 ms
CONNECT

SM-G991B
17:11
Devices
DISCONNECT
DFU
BONDED
ADVERTISER
DB300
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CONNECTED
NOT BONDED
CLIENT
SERVER
Generic Attribute
UUID: 0x1801
PRIMARY SERVICE
Generic Access
UUID: 0x1800
PRIMARY SERVICE
SMP Service
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PRIMARY SERVICE

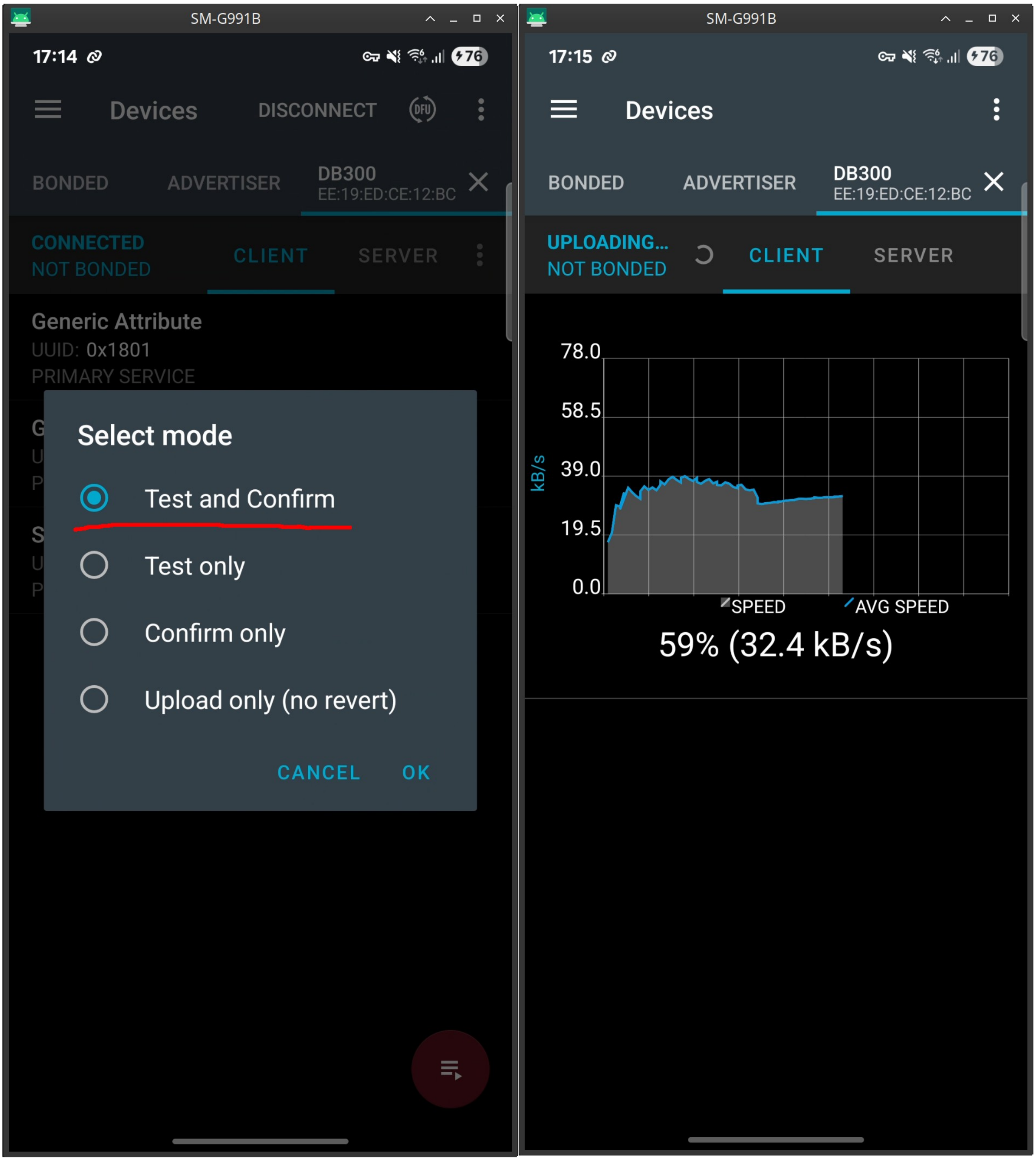

Figure 5 – Firmware upgrade using Bluetooth

2.2 SWD interface

Although the Bluetooth method is preferred, the db300 modules can also be flashed using the on-board SWD (Serial Wire Debug) interface.

1. Connect a debugger to the SWD header on the module. You can use a JLink or DAPLink or similar debugger that is compatible with SWD
2. Download the latest firmware at: https://download.bluemark.io/dronebeacon/db300.bin
   Release notes can be found here: https://download.bluemark.io/db300.txt
3. Flash the firmware to address *0xC000* Example command using pyocd application:
   ```
   pyocd flash -t nrf52840 --base-address 0xc000 db300.bin
   ```

3 CONFIGURATION

The db300 module can be configured via the CAN bus (DroneCAN) or MAVLink. The db300 is a "dumb" RemoteID module as the flight controller needs to stream the RemoteID messages. Please read RemoteID configuration documentation of the flight controller to set it up RemoteID correctly.

DroneCAN

In this section, we assume that the db300 is connected via DroneCAN to the flight controller. Open DroneCAN GUI Tool. A device called db300 should be visible. Double click on it to receive more options/ information. A screen like Figure 6 should appear.

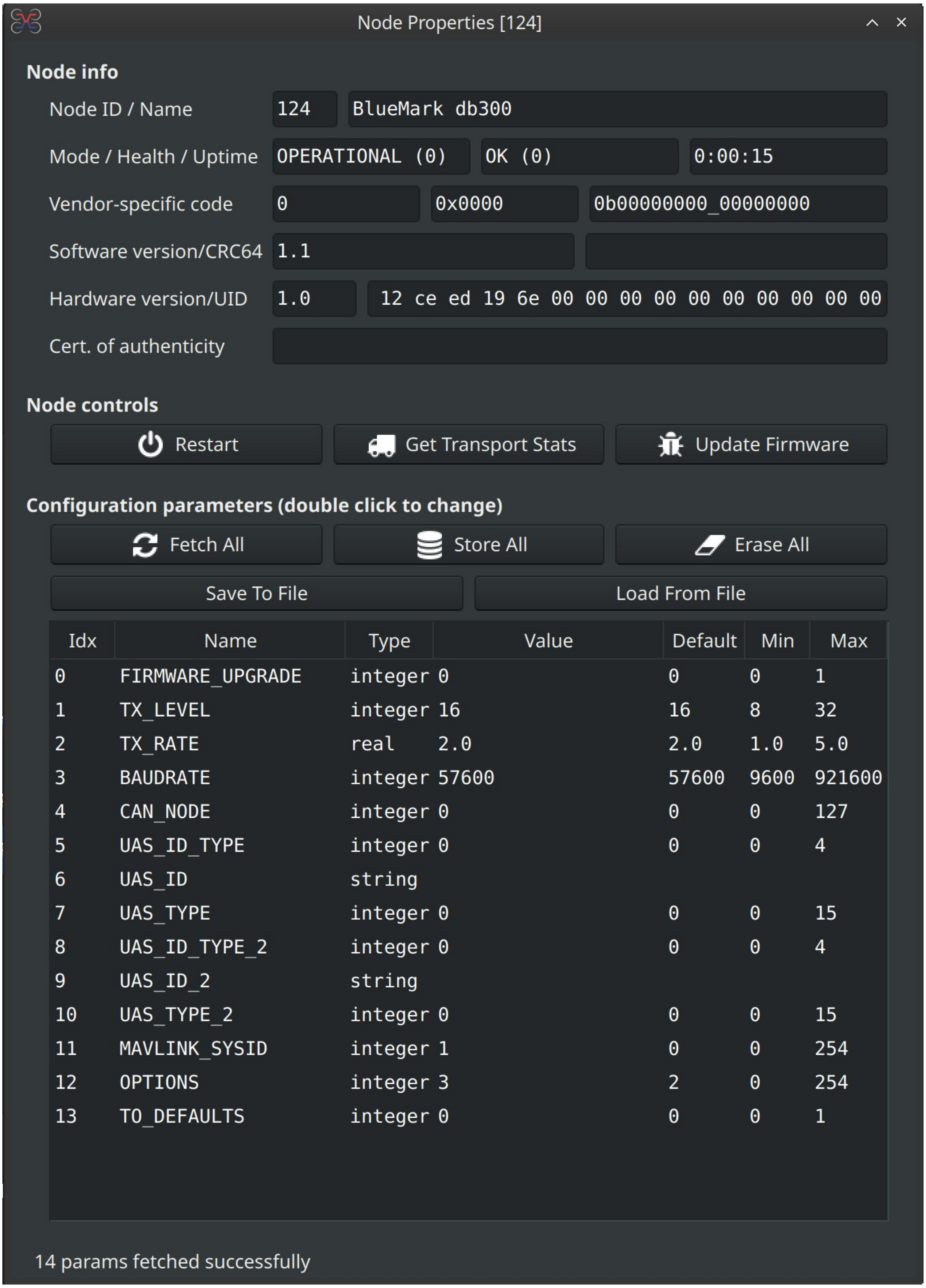

Figure 6 – DroneCAN GUI tool db300 details

Parameters
The current firmware (1.1) has these parameters

- *FIRMWARE_UPGRADE* – puts the db300 module in firmware upgrade mode (set it to 1) for upgrading via Bluetooth. See section 2.1.
- *TX_LEVEL* – The output transmit power level of the BMD-345 radio module. You can set it between +8 to +32 dBm. The manufacturer u-blox advises to use +16 dBm for the USA. A higher level can be used, but this *outside* the u-blox FCC certification.
- *TX_RATE* – Sets how fast the RemoteID information is broadcast. The minimum is 1 Hz. Default is 2 Hz, because the location information needs to be less than 1 seconds ago. Using 2 Hz will make it easier to comply with this requirement.
- *BAUDRATE* – Set the baudrate of the MAVLink interface. Similar parameter as ArduRemoteID firmware.
- *CAN_NODE* – Sets the CAN Node ID. Similar parameter as ArduRemoteID firmware.
- *UAS_ID_TYPE* – Sets the ID type like Serial Number type. Similar parameter as ArduRemoteID firmware.
- *UAS_ID* – Sets the ID. In most cases you configure the Serial Number. Similar parameter as ArduRemoteID firmware.
- *UAS_TYPE* – Sets the UAS type like Multirotor or Helicopter. Similar parameter as ArduRemoteID firmware.
- *UAS_ID_TYPE_2* – Sets the ID type like Serial Number type of the second ID. Similar parameter as ArduRemoteID firmware.
- *UAS_ID_2* – Sets the ID. In most cases you configure the Serial Number of the second ID. Similar parameter as ArduRemoteID firmware.
- *UAS_TYPE_2* – Sets the UAS type of the second ID like Multirotor or Helicopter. Similar parameter as ArduRemoteID firmware.
- *MAVLINK_SYSID* – Sets the sys ID of the MAVLink interface. Similar parameter as ArduRemoteID firmware.
- *OPTIONS* – Options parameter. Similar parameter as ArduRemoteID firmware plus extra options.
- *TO_DEFAULTS* – If set to 1, it will reset all parameters to default and restarts the module. Similar parameter as ArduRemoteID firmware.

BasicID
In the db300 you can configure two basicID messages. The default OPTIONS parameter is 2. This means that the db300 will <u>not save</u> any basicID message to non-volatile memory. Set OPTIONS to 0 to get similar behavior like stock ArduRemoteID firmware. In that case the received basicID data will be stored in UAS_ID/UAS_ID_TYPE and UAS_ID.

- If you configured UAS_ID/UAS_ID_TYPE and UAS_ID in the module, received BasicID data from the flight controller will replace the configured data. Only flight controller basicID data will be broadcast
- If you want to use a two basicID messages, but also want to stream one from the flight controller, please configure UAS_ID_2/UAS_ID_TYPE_2 and UAS_ID_2 in the module. The first UAS_ID will be set by the flight controller.

Options
The db300 firmare (1.1 or higher) has the following bits in the OPTIONS variable.

Bit 0 – if set to 1, the module will always return ARM OK message. If set to 0 (default) the OPEN_DRONE_ID_ARM_STATUS depends on the received data. Similar to ArduRemoteID firmware.
Bit 1 – if set to 1 (default i.e. OPTIONS = 2), received BasicID data will not be stored to non-volatile memory by the db300 module. Similar to ArduRemoteID firmware.

Bit 2 – if set to 1 it will print debug RID MAVLink messages to the MAVLink interface. If set to 0 (default), nothing no debug information will be print.
Bit 3 – spare /not used
Bit 4 – if set to 1, the db300 will not enter firmware mode if it has not received a RemoteID message for 15 minutes. (See Section 2.1, point 3.)

Planned features

- ~~*Setting the CAN Node ID*~~ *(version 1.1)*
- ~~*Configuration via MAVLink*~~ *(version 1.1)*
- ~~*Store the BasicID in non-volatile storage in the db300 module (similar to the ArduRemoteID firmware)*~~ *(version 1.1)*
- LOCK_LEVEL
- *DroneCAN DNA support*
- update firmware using DroneCAN interface
- DroneCAN FD support (up to 8 Mbits)
- *Support for Auth messages using DroneCAN (MAVLink supports already Auth messages)*

4 WARRANTY

The product has a two-year warranty period, starting at the date of receiving the product. Outside warranty are issues like crash damage, improper use, (extreme) weather conditions that damages the product. The product is eligible for future firmware updates as described in the Firmware section.

5 More information

If you need more information, please contact us at info@bluemark.io or by phone: +31 53 711 2104.

All contact information can be found at the *DroneScout* contact page: https://dronescout.co/contact/