

Botlink XRD

Documentation Revision 2.9

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Revision History

Version	Date	Notes
2.0	29 Oct 2018	Version 2.0 release
2.1	20 Mar 2019	Instructions for finding XRD ID
2.2	13 Apr 2019	Expected autopilot configuration
2.3	30 Jun 2019	Added sections on Wifi & Autopilot configuration using config.toml; updated status light section; added language about beta support for Micropilot autopilots
2.4	24 Jul 2019	Add UART voltage information
2.5	16 Aug 2019	Update Quickstart
2.6	30 Oct 2019	FCC Declaration of Conformity; various reorganizations
2.7	13 Mar 2020	Updated status light documentation; added cell data logging documentation and video documentation
2.8	03 May 2020	Added note about MicroUSB to Power section APN now configured via config.toml
2.9	03 Sept 2020	Added example of cell band filtering

Customer Support

Customer support is available 9 am - 5 pm, excluding weekends and holidays.

For **phone support**, dial +1 (701) 412-2988 and ask to speak to customer support.

For **email support**, email support@botlink.com.

Product Description

The Botlink XRD (eXtended Range Datalink) is a secure drop-in replacement for your existing serial drone radio that allows you to control your drone using cellular networks from anywhere in the world over the internet via a 128-bit AES encrypted and authenticated connection. About the size of a deck of cards, and weighing about as much as a 60 watt lightbulb¹, the Botlink XRD can be mounted on a variety of drones, from small quadcopters to large fixed-wing aircraft. Botlink provides a variety of applications that enable you to continue using your existing ground control software and workflow with the XRD, making it easy to incrementally adopt the Botlink XRD for use with your drone fleet.

Supported Airframe Types

The Botlink XRD passes traffic from the autopilot to the ground control station, and therefore supports any airframe type that the autopilot supports.

Supported Message Protocols

The Botlink XRD supports the following messaging protocols.

Protocol	Version	Notes
Mavlink	1 2	Example autopilots: Pixhawk, Pixhawk 2, ArduPilotMega, PixFalcon
Micropilot	Any	Beta

Supported Manufacturers

The Botlink XRD is broadly compatible with products from manufacturers that use the Supported Message Protocols discussed in the previous section.

Consumer drones from DJI and other manufacturers which use proprietary communications protocols are not supported.

¹ Without enclosure or antennas

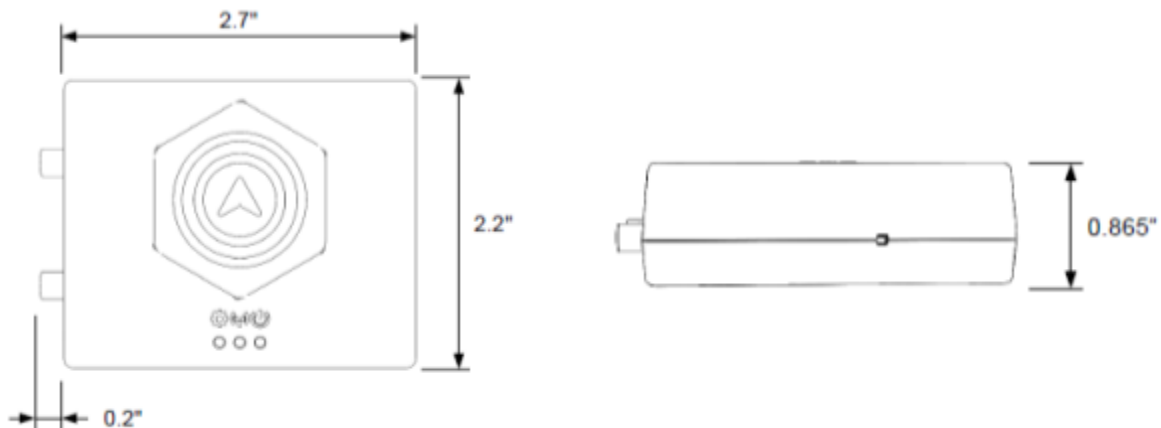
Supported cellular carriers

The Botlink XRD supports a variety of cellular carriers through the ability to swap modems & sim cards. Carrier support includes, but is not limited to Verizon, AT&T, TMobile, Rogers, Telus, Orange, and various other European carriers. For a list of supported modems and cellular bands, see the Modem, Antennas, and SIM section.

Mechanical

The Botlink XRD can be used either with an enclosure or without an enclosure. The enclosure offers increased splash and dust resistance².

Size, weight, and power

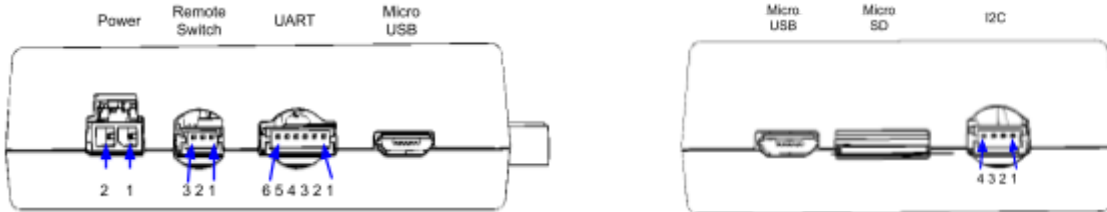


Size & Weight			Power	
	Metric	Imperial	Input Voltage	5.5 - 30V
Weight, w/o enc:	36 grams	1.27 oz	Typical Power	1.5W
Weight, w/ enc:	61 grams	2.15 oz	Peak Power	10W + 2.5W per USB Port
Height:	22.1 mm	0.83 in	Operating Limits	
Width:	64.7 mm	2.55 in	Temperature	0 to 40 C (32 to 104F)
Depth:	51.2 mm	2.02 in	Rel Humidity	0 - 85%

² The Botlink XRD has not been tested for moisture or dust resistance using any industry standards (i.e. IPX8).

Ports

The Botlink XRD includes 2 host-only Micro-USB B ports, 1 UART port, 1 power port, 1 I2C port, and 1 power port.



Power		Remote Switch ³		UART (3.3V)	
P/N 43645-0200		P/N DF13-3S-1.25C		P/N DF13-6S-1.25C	
Pin	Description	Pin	Description	Pin	Description
1	Positive	1	3.3 V	1	No Connect
2	Ground	2	LED	2	XRD RX
		3	Press Detect	3	XRD TX
				4	XRD RTS
				5	XRD CTS
				6	Ground

I2C⁴

P/N DF13-4S-1.25C

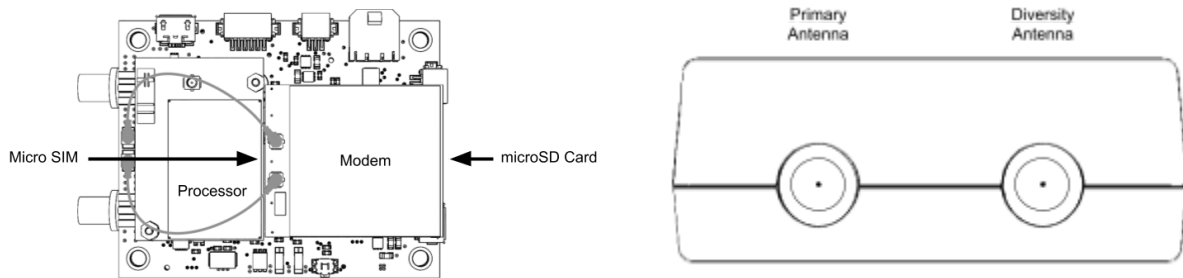
Pin	Description
1	5 Volts
2	SCL
3	SDA
4	Ground

³ Not currently used

⁴ Not currently used

Antennas, modem, and SIM

The Botlink XRD modem, antennas, and SIM are field-swappable. Enclosure removal is required to swap the modem or SIM. Please contact Botlink prior to swapping your modem to ensure that the firmware supports the modem you are attempting to use.



Antennas

Name	Type	Part Number
Taoglas TG.30.8113 - A, II/ GPS/Wifi Antenna	Rigid	TG.30.8113
Taoglas FXUB66.01.0305C	Flex	FXUB66.01.0305C

Modems			
Name	4G Bands	3G Bands	Carriers Supported
NL-SW-LTE-TSVG	B4, B13	<i>None</i>	Verizon
NL-SW-LTE-TNAG NL-SW-LTE-TNAG-B	B2, B5, B4, B17	B2, B5	AT&T, TMobile
NL-SW-LTE-TEUG	B3, B7, B20	B1, B5, B8	Various European
NL-SW-LTE-QBG96	LTE-M/NB-IoT: B1, B2 B3, B4,B5, B8, B12, B13, B18,B19, B20, B26, B28, B39	<i>None</i> 2G fallback on GSM850,GSM900,DC S1800,PCS1900	Verizon, TMobile, AT&T, Sprint, Telus, Various European
NL-SW-LTE-TC4EU	LTE-FDD: B1, B3, B7, B8, B20	B1, B8 2G fallback on GSM900,DCS1800	Orange LTE, Various European
NL-SW-LTE-TC4NAG	LTE-FDD: B2, B4, B5, B12, B13, B14, B66, B71	DC-HSPA+ B2[1900], B4[1700], B5[850]	Various North American

LTE-M and NB-IoT are low power, low bandwidth technologies.

Getting Started

Getting started with the Botlink XRD is quick and easy. You'll only need a computer with an internet connection to create a Botlink account, register your XRD, and install some software, and a work area with a flat surface that you use to install the Botlink XRD hardware on your drone.

1 Install the Botlink Relay software

The first step to using your Botlink XRD is installing the Botlink Relay software. The Botlink Relay software enables you to connect your ground control station to your Botlink XRD-equipped drone without any modifications. The Botlink Relay software is available for Mac and PC.


To get the most recent version of Botlink Relay, please contact info@botlink.com.

2 Register your Botlink XRD

Once the Botlink Relay software is installed, you're ready to register your Botlink XRD to your account. To register your XRD, you'll need to know the Hardware ID of your unit. This should have been provided to you as part of your order documentation. If it wasn't, or you can't find the information, see the "[Determining the XRD Hardware ID](#)" section below.

To register your Botlink XRD

1. Open the Botlink XRD Tray App
2. Enter your username and password

3. Click “Login”
4. Switch to the  tab
5. Click “Register an XRD” and input the Hardware ID for the XRD.

3 Configure the Botlink Relay software

In order to use your existing ground control station and other software applications with the Botlink XRD, you’ll need to tell the Botlink Relay software how your software will communicate -- using TCP, UDP, or Serial⁵.

Configuring the Botlink Relay Software is simple.

Configuring UDP

1. Open the Botlink XRD Tray App
2. Enter your username and password
3. Click “Login”
4. Select the UDP Connection method
5. Enter a port
 - a. The “Listen” port will receive data from the Ground Control Software
 - b. The “Write Port” will transmit data to the Ground Control Software
6. Select a Botlink XRD to connect to
7. Click the start button

Configuring TCP

1. Open the Botlink XRD Tray App
2. Enter your username and password
3. Click “Login”
4. Select the TCP Connection method
5. Enter a port
6. Select a Botlink XRD to connect to
7. Click the start button

Configuring Serial

1. Open the Botlink XRD Tray App
2. Enter your username and password

⁵ Serial support only available on Windows

3. Click “Login”
4. Select the Serial Connection method
5. Select a port
6. Enter the baud rate
7. Select a Botlink XRD to connect to
8. Click the start button

[Optional] Configure GoPro Video Streaming

1. Open the Botlink XRD Tray App
2. Enter your username and password
3. Click “Login”
4. Click “Add Stream”
5. Enter “video” for the stream name
6. Select “udp” for the type
7. Select a Listen Port (currently unused)
8. Select a Write Port to receive video
 - a. This is the UDP port that the video will be broadcast to. You’ll need to configure your video playback software (e.g. VLC) to listen for UDP video from the port you selected

4 Configure your Ground Control Station

Now that you’ve configured the Botlink Relay application, you’ll need to make sure that your application is configured to communicate with your drone through the Botlink Relay software. This process varies depending on the software, but the following example of configuring QGroundControl should help you get started.

To configure QGroundControl to use the Botlink Relay software to connect to your drone, do the following.

QGroundControl - TCP

1. Open QGroundControl
2. Click on the “Q” in the upper left corner
3. Click on “Comm Links”
4. Click “Add”
5. Select “TCP” as the type
6. Enter a name for your connection
7. Enter 127.0.0.1 in the Host Address field
8. Enter the port number from the Botlink Tray app in the TCP port field
9. Click “OK”

10. Click “Connect”

QGroundControl - UDP

1. Open QGroundControl
2. Click on the “Q” in the upper left corner
3. Click on “Comm Links”
4. Click “Add”
5. Select “UDP” as the type
6. Enter a name for your connection
7. Enter the “Write Port” number from the Botlink Tray App in the Listening Port field
8. Under Target Hosts, click Add
9. Enter 127.0.0.1: followed by the “Listen Port” number from the Botlink Tray App
 - a. Ex: 127.0.0.1:1024
10. Click “OK”
11. Click “Connect”

5 Install the Botlink XRD on your drone

Once the application and Botlink Relay have been configured, it’s time to install the Botlink XRD on your drone. This process varies depending on the drone, but generally speaking you’ll need to identify a mounting location on the drone for the Botlink XRD (either with or without enclosure) and attach the unit, connect the serial cable, connect the power cable, and connect the antennas.

5.1 Mounting the XRD

Mounting the Botlink XRD is a straightforward process. Customers have used everything from rubber bands to Velcro to physically attach the Botlink XRD to their drone. When mounting the Botlink XRD, keep in mind that it requires a connection to the autopilot and power in order to function. The included power cable is approximately 12 inches long, and the included serial cable is about 9 inches long. If you’re planning on using your Botlink XRD without the enclosure, make sure that the unit is protected from dust and moisture. This is most easily accomplished by mounting the enclosureless unit inside the drone fuselage.

5.2 Connect the serial cable

The serial cable included with the Botlink XRD is a 6-pin DFU cable that is suitable to use when connecting to a Pixhawk autopilot. Either end of the cable can be connected to either the autopilot or the XRD.

5.3 Connect the power cable

The power cable included with the Botlink XRD is suitable to use when connecting directly to a 3S to 7S battery LiPo battery.

NOTE The XRD *cannot* be powered from the Micro USB ports.

5.4 Connect the antennas

The TAOglas antennas included with the Botlink XRD have an adhesive backing that makes them easy to mount to most drone airframes.

6 Configure the Botlink XRD

Configuring the Botlink XRD can be accomplished using a MicroSD card. In order for the XRD to successfully connect to the autopilot and cellular network, you'll need to give the unit some basic information about your drone's autopilot and your cellular service.

6.1 Configuring the cellular service

To enable the XRD to connect to the cellular service and send and receive drone data, it needs to know the Access Point Name (APN) used by your cellular service provider. This is a short string of letters and numbers that is provided by a cellular service provider that lets your device know where to look for service.

Generally speaking, the Botlink XRD ships with a pre-configured APN that is suitable for use with consumer cellular plans provided by the major US cellular service providers. The following table lists the default APNs used by the Botlink XRD.

Modem	Default APN
LTE-TSVG	VZWINTERNET
LTE-TNAG	phone
LTE-EU	<i>N/A; Depends on carrier</i>
LTE-TC4NAG	<i>N/A; Depends on carrier</i>
LTE-TC4EU	<i>N/A; Depends on carrier</i>

If you have a business or enterprise account and have a custom APN, or have instructions from your wireless provider to use a custom APN, the APN used by the Botlink XRD can be configured as required.

NOTE	The APNs supported by the Botlink XRD depend on the installed modem, sim card, and your wireless plan. Contact your wireless provider for details on which APN to use with your Botlink XRD.
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WARNING	Incorrectly changing the APN on your Botlink XRD may result in <ul style="list-style-type: none">• Loss of network connectivity• Degradation or loss of all Botlink XRD functionality requiring a network connection• Roaming charges from your wireless provider
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The APN is configured using the **config.toml** file on the microSD Card filesystem root.

To update the APN used by the Botlink XRD

1. Power down the drone
2. Remove the microSD card from the microSD card reader in the XRD
3. Insert the microSD card into your device's microSD card reader
4. Open or create the **config.toml** file
5. Add the content shown, filling in the APN you'd like to use

```
[cell]
apn = "VZWINTERNET"
```

6. Save the file
7. Remove the microSD card from your device's microSD card reader
8. Insert the microSD card into your Botlink XRD's microSD card reader
9. Power on the drone

NOTE	As of firmware v3.1.4, the XRD_APN file is no longer used to set the APN
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6.2 Configuring the autopilot connection

The Botlink XRD can be configured to connect to a variety of different autopilots. Configuration can be accomplished either using a configuration file on the Botlink XRD SDCard, or the legacy configuration method can be used.

Each configuration method is described in the following sections.

With a configuration file

WARNING

If you configure your autopilot connection using the following steps, and then subsequently remove the SDCard from your drone, the Botlink XRD will attempt to connect to the autopilot using legacy MAVLink v1 settings, as described in the “Without a configuration file (legacy)” section.

To configure your XRD’s autopilot connection, do the following:

1. Power down the drone
 2. Remove the microSD card from the Botlink XRD, if installed
 3. Insert the microSD card into your computer
 4. Open or create the **config.toml** file on the SDCard
 5. Add content to the file as shown, substituting
Either “mavlink” or “micropilot” for the protocol
The correct baud rate for your serial port
If protocol = "mavlink" is used, version = 2 will force MAVLink v2 protocol, otherwise auto detection is attempted.
- ```
[serial]
protocol = "mavlink"
baud = 57600
version = 2
```
6. Save the file
  7. Remove the microSD card from your computer
  8. Insert the microSD card into the microSD card reader on your Botlink XRD
  9. After the system is powered on, your device will attempt to connect to the autopilot using your specified settings

## Without a configuration file (legacy)

Depending on the model and firmware version of the MAVLink compatible autopilot on your drone, you may have to update configuration settings to enable the autopilot and Botlink XRD to communicate seamlessly.

### NOTE

Autopilot configuration should be accomplished using the USB radio or hardwire GCS connection provided with your drone

To configure your MAVLink compatible autopilot for use with the Botlink XRD



1. Determine which autopilot telemetry port the Botlink XRD uses for communication
2. Configure the autopilot telemetry port to send serial data with a 115200 baud rate, 8 data bits, no parity bits, and 1 stop bit
3. Configure the autopilot telemetry port to send data using MAVLink V1 format

Autopilots from different manufacturers may have different names for the configuration settings, and the process for changing the settings for specific autopilots is outside the scope of this document. Consult the documentation provided by your autopilot manufacturer to determine the method for changing the required settings.

After changing the settings on your autopilot, make sure to power cycle the autopilot and Botlink XRD to ensure the new settings are applied.

### 6.3 [Optional] Configuring Video Streaming

The Botlink XRD supports streaming video from a GoPro Video Camera.

#### WARNING

Botlink XRD Video Streaming is currently in beta. While efforts have been made to test and validate video streaming functionality, no reliability guarantees can be made at this time. Configuration files formats, supported cameras, and software version requirements may change at any time.

***Video streaming functionality is not a substitute for a ground observer or visual line of sight requirements for drone operations.***

Before you begin, make sure that your Botlink XRD is [configured to connect to your GoPro's WiFi network](#).

To configure your drone to stream video

1. Power down the drone
2. Remove the microSD card from the Botlink XRD, if installed
3. Insert the microSD card into your computer
4. Open or create the config.toml file on the SDCard
5. Add content to the file as shown

```
[video]
sensor = "gopro"

[wifi]
```

```
network = "GOPRO NETWORK NAME"
password = "GORPO NETWORK PASSWORD"
default = false
```

6. Save the file
7. Remove the microSD card from your computer
8. Insert the microSD card into the microSD card reader on your Botlink XRD

## 6.4 [Optional] Configuring cell network metrics logging

The Botlink XRD supports logging various cell network metrics, such as RSSI, RSSQ, connected tower, etc. A metrics file will be created on the SDCard and available post-flight.

To configure your XRD to log cell network metrics

1. Power down the drone
2. Remove the microSD card from the Botlink XRD, if installed
3. Insert the microSD card into your computer
4. Open or create the config.toml file on the SDCard

```
[cell]
logging = true
```

5. Add content to the file as shown
6. Save the file
7. Remove the microSD card from your computer
8. Insert the microSD card into the microSD card reader on your Botlink XRD

## 7 Connect to your drone

Now that you've installed your XRD on your drone, configured the Botlink Relay software, and setup your GCS, you're ready to connect to your drone.

To connect to your drone

1. Open the Botlink Relay software
2. Click start
3. Open QGroundControl
4. Select the connection you created
5. Click Connect

## 7.1 [Optional] Start video streaming

Once the drone is connected via the Botlink Relay application, you can start the video stream.

1. Click on the Status button
2. Click the Start Button located underneath the “Payload streams” heading

## Additional & optional tasks

### WiFi Configuration

The Botlink XRD can be configured to connect to a WiFi network to provide connectivity in areas where cellular connections are poor, such as the inside of certain office buildings.

WiFi can also be used for connecting to peripheral devices, such as WiFi enabled cameras.

Configuration is handled by placing a file named **config.toml** on the SDCard.

**NOTE**

The contents of the config.toml file are case sensitive, and require quotes around the wifi network name and password.

To configure your XRD to connect to a WiFi network, do the following:

1. Power down the drone
2. Remove the microSD card from the Botlink XRD, if installed
3. Insert the microSD card into your computer
4. Open or create the config.toml file on the SDCard
5. Add content to the file as shown, substituting your network name and password for the placeholder values

```
[wifi]
network = "your network name"
password = "something super secure"
```

6. If this connection will not provide access to the internet, add `default = false`
7. Save the file
8. Remove the microSD card from your computer
9. Insert the microSD card into the microSD card reader on your Botlink XRD
10. After the system is powered on, your device should be connected to the WiFi network

## Cellular Band Filtering

Certain jurisdictions may prohibit operating on specific cellular frequencies. The Botlink XRD supports both allow listing and deny listing of cellular bands based on LTE band nomenclature.

By default, all bands are enabled. If an allow list is defined, only bands enabled in the allow list are permitted (and overlapping 2G/3G bands). Denied bands take precedence over allowed bands. Any denied bands (and overlapping 2G/3G bands) will never be permitted.

1. Remove the microSD card from the Botlink XRD, if installed
2. Insert the microSD card into your computer
3. Open or create the config.toml file on the SDCard
4. Add content to the file as shown, substituting your own white/black list values:

```
[cell]
bands = ["!5"]
```

5. If this connection will not provide access to the internet, add `default = false`
6. Save the file
7. Remove the microSD card from your computer
8. Insert the microSD card into the microSD card reader on your Botlink XRD
9. After the system is powered on, your device should be connected to the WiFi network

### Example configurations:

**Allow list** Enable only LTE bands 4 and 13:

```
[cell]
bands = ["4", "13"]
```

If the modem installed supports 2G or 3G fallback, this will also enable UTRAN bands 4, 13 as well as GSM band "G710".

**Deny list** Enable all bands except bands 3 and 8:

```
[cell]
bands = ["!3", "!8"]
```

If the modem installed supports 2G or 3G fallback, this will also deny UTRAN bands 3, 8 as well as GSM bands "PCS" and "EGSM".

**Mixed lists** It is permitted to mix allow and deny options. Only bands that are allowed and also not denied will be enabled.

```
[cell]
```

```
bands = ["!8", "4", "3", "!3"]
```

This results in only LTE band 4 enabled and, if supported, UTRAN band 4.

## Determining the XRD Hardware ID

The Botlink XRD's Hardware ID is needed to register a Botlink XRD to an account. This is written to a file at the root of the SDCard file system every power cycle.

To view the Hardware ID, do the following:

1. Insert a microSD card into the microSD card reader in your Botlink XRD
2. Power on your XRD
3. Wait 1 minute
4. Power down your XRD
5. Remove the microSD card from the microSD card reader in your Botlink XRD
6. Insert the microSD card from your Botlink XRD into the microSD card reader on your device
7. View the contents of your micro SD card on your device
8. Open the file named XRD\_HARDWARE\_ID using Notepad
9. The contents of the file will be the Hardware ID of your Botlink XRD

## Determining Software Version

The software version of the Botlink XRD is written to a file at the root of the SDCard file system every power cycle.

To view the software version of the software installed on your Botlink XRD, do the following:

1. Insert a microSD card into the microSD card reader in your Botlink XRD
2. Power on your XRD
3. Wait 1 minute
4. Power down your XRD
5. Remove the microSD card from the microSD card reader in your Botlink XRD
6. Insert the microSD card from your Botlink XRD into the microSD card reader on your device
7. View the contents of your micro SD card on your device
8. Open the file named XRD\_OS\_VERSION using Notepad
9. The contents of the file will be the software version of the software on your Botlink XRD

## Software Updates

The Botlink XRD software can be updated using an SDCard. The update process should take about 5 minutes.

**WARNING**

Ensure the UAV has fully charged batteries or is connected to external power before starting the update process. Do not disconnect power during the update process.

1. Download the latest XRD upgrade.tar.gz file to your computer
2. Power down the drone
3. Remove the microSD card from the Botlink XRD
4. Insert the microSD from the Botlink XRD card into your computer.
  - a. Your microSD card should be FAT32 formatted. Most should default to this. The optimum microSD card Botlink suggests is the SanDisk Ultra PLUS UHS-1, no larger than 32GB Remove all images/files from the XRD's microSD card.
5. Move the upgrade.tar.gz file to the XRD's microSD card
6. Eject the SDCard from your computer
7. Insert the card into the Botlink XRD
8. Power on the UAV
9. Once the update begins installing, the LED will stay either ON or OFF
10. After installation is complete the Status LED will illuminate

**NOTE**

The upgrade.tar.gz file is deleted from the SDCard when the upgrade is successfully installed. If you are upgrading multiple XRDs, you will need to copy the upgrade.tar.gz file to the SDCard again for each device that will be upgraded.

### Force re-installation

If the preceding steps do not result in a successful version upgrade, it may be necessary to force a system update.

To force a system upgrade, do the following:

1. Power down the drone
2. Remove the microSD card from the reader on the Botlink XRD
3. Insert the microSD card into the microSD card reader on your device
4. Create a file named XRD\_FORCE\_UPGRADE

- a. Ensure there is no file extension
- 5. Remove the microSD card from the reader on your device
- 6. Follow the normal installation instructions starting from step 7

## Troubleshooting

### XRD Remix status light diagnostic codes

The Botlink XRD Remix is identified by 3 upward facing status lights on the long edge of the board.

After upgrading to Botlink XRD App Version 3.1.1 or later, the following diagnostic codes are available.


#### Status Light

The Status Light is a RGB LED. When the XRD is installed with the supplied case, the Status Light is denoted by a “Gear” symbol.

The status light is used to indicate 2 things

- Which configured network is being used to connect to the internet
- If the Autopilot is sending or receiving messages

When the XRD is initializing, the Status Light may change color several times. Once the system is initialized, the following table summarizes the various states of the Status Light, and their interpretations.

| <b>Status Light</b>  |                                        |                 |                                |
|---------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------|--------------------------------|
| <i>Color</i>                                                                                            | <i>Network State</i>                   | <i>Blinking</i> | <i>Autopilot State</i>         |
| Red                                                                                                     | No network connected to internet       | Yes             | Sending/receiving messages     |
|                                                                                                         |                                        | No              | Not sending/receiving messages |
| Green                                                                                                   | Ethernet or WiFi connected to internet | Yes             | Sending/receiving messages     |
|                                                                                                         |                                        | No              | Not sending/receiving messages |
| Blue                                                                                                    | Cellular connected to internet         | Yes             | Sending/receiving messages     |
|                                                                                                         |                                        | No              | Not sending/receiving messages |

### Network Light

The Network Light is a single color blue LED. When the XRD is installed with the supplied case, the Network Light is denoted by a “Radio Tower” symbol.

The network light is used to denote 2 things

- Is the XRD ready to receive messages for the autopilot from the network
- Is the XRD actually receiving messages for the autopilot from the network

When the XRD is initializing, the Network Light may turn on and off several times. Once the system is initialized, the following table summarizes the various states of the Network Light, and their interpretations.

| <b>Network Light</b> |                 |                                  |
|----------------------|-----------------|----------------------------------|
| <i>Color</i>         | <i>Blinking</i> | <i>XRD State</i>                 |
| Not illuminated      | No              | Not ready to receive messages    |
| Blue                 | Yes             | Ready & receiving messages       |
|                      | No              | Ready but not receiving messages |

### Power Light

The Power Light is a single color green LED. When the XRD is installed with the supplied case, the Power Light is denoted by a raised “Power Button” symbol.

The Botlink XRD Power Light is always illuminated when the system is powered on.

### XRD Vanilla status light diagnostic codes

The Botlink XRD Vanilla is identified by 3 upward mounted USB ports on the long edge of the board.

After upgrading to Botlink XRD software version 3.1.2 or higher, the following diagnostic codes are available.

| <b>Status Light State</b> | <b>Interpretation</b>       |
|---------------------------|-----------------------------|
| Solid light               | Installation was successful |



|             |                                           |
|-------------|-------------------------------------------|
| One blink   | Unable to connect to the drone autopilot  |
| Four blinks | Unable to connect to the cellular network |

# FCC Declaration of Conformity

Botlink  
201 5th St N Suite 1500  
Fargo, ND 58102

29 September 2015

These devices comply with Part 15 of the FCC Rules and Regulations for Information Technology Equipment. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation.

**Device Name:** Botlink XRD

**Responsible Party:** Botlink LLC  
201 5th St N Suite 1500  
Fargo, ND 58102

**Contact Person:** Tyler Laber  
tyler.laber@botlink.com

**Equipment Class:** FCC Part 15.209 Class B  
**Equipment Type:** Remote Data Processing Module

It includes a transmitter with modular approval. No testing was performed on the radio functionality of the equipment because it already had FCC and IC approval.

**Manufacturer:** Telit  
**Model:** LE910-SVG  
**FCC ID:** RI7LE9105V  
**IC:** 5131A-LE9105V

The device was tested with 2 antennas and 2 different antenna model options:

**Antenna/Option 1:** Taolas TG.30.8113  
**Antenna/Option 2:** Taoglas Maximus, M/N FXUB66

We, the responsible party Botlink LLC, declare that the Botlink XRD was tested to conform to the applicable FCC rules and regulations. The method of testing was in accordance with the appropriate measurement standards, and all necessary steps have been taken to ensure that all production units of these devices will continue to comply with the Federal Communications Commission's requirements.