



microLink

User and Installation Guide



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1 Revision History

| Revision | Date | Comments |
|----------|------------|--|
| A | 6/23/2019 | Initial release |
| B | 07/17/2019 | Modified the FCC and added the IC regulatory statement |
| C | 08/09/2019 | Updated the skyStation statistics definitions and modified for uav files updating |
| D | 08/12/2019 | Updated the FCC and IC statements per the TCB |
| E | 08/28/2019 | Updated the RF exposure limits per the TCB |
| F | 12/18/2019 | Added Updating instructions for skyStation and microLink radios |
| G | 7/21/2020 | Updated configuration item descriptions. Updated firmware upgrade instructions. |
| H | 10/27/2020 | Add Transmit and Receive Masking configuration instructions. |
| I | 1/25/2021 | Quick Start and Here2 appendices moved to separate documents. Updated screen captures. Added remote configuration instructions. |

2 Limited Warranty

uAvionix products are warranted to be free from defects in material and workmanship for one year from purchase. For the duration of the warranty period, uAvionix, at its sole option, will repair or replace any product which fails under normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost.

This warranty does not apply to cosmetic damage, consumable parts, damage caused by accident, abuse, misuse, water, fire or flood, damage caused by unauthorized servicing, or product that has been modified or altered.

IN NO EVENT, SHALL UAVIONIX BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Warranty Service

Warranty repair service shall be provided directly by uAvionix.

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4 Introduction

microLink is an aviation grade, miniature, Beyond Visual Line Of Sight (BVLOS) data link radio specifically designed for long range, robust, Unmanned Aircraft Systems (UAS) telemetry data links. Ideal for size, weight, power and performance sensitive applications, microLink operates in the 902-928MHz license-free ISM band.

5 Specification

5.1 microLink Radio Technology

- Dual radio architecture for true diversity
 - Path (spatial) diversity
 - Frequency diversity
 - Polarization gain
- Dynamic Medium and Multiple access, time and position synchronized, to support 100s of simultaneous links
 - Adaptive time and frequency spreading
- Global Positioning System (GPS) Coordinated Universal Time (UTC) link synchronization
- Status, integrity and health monitoring
- Environmental RTCA/DO-160G
- Software RTCA/DO-178C Level C
- Complex Hardware RTCA/DO-254 Level C
- FCC 47 CFR Part 15.247 ID 2AFFTC2XISM

| Radio Specifications | |
|-----------------------------|-----------------------|
| Band | 902-928MHz ISM Band |
| Architecture | Dual Diversity Radios |
| Transmit Power | 1W (4W EIRP) |
| Spreading | Code and Frequency |
| Bandwidth | 200kHz |
| Receiver Sensitivity | |
| User Receiver | -118dBm |
| Control Receiver | -121dBm |
| Doppler Capture Range | ±16kHz |

5.2 Regulatory Statements

5.2.1 FCC Statement

FCC ID: 2AFFTC2XISM

This device meets the FCC requirements for RF exposure in public or uncontrolled environments.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

5.2.2 Industry Canada Statement

IC ID: 25261-C2XISM

In order to comply with FCC / ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps.

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

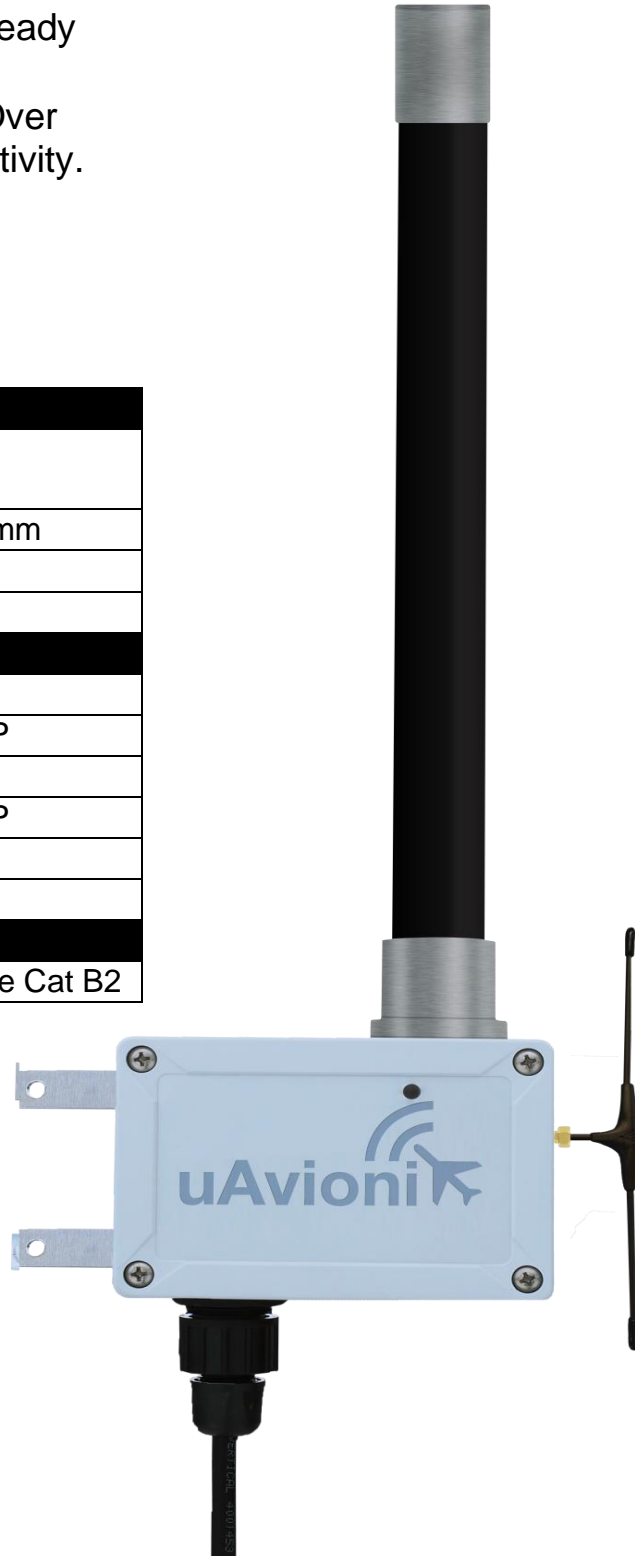
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) l'appareil ne doit pas produire de brouillage;
- 2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.”

5.3 Ground Radio System (GRS) – skyStation

- All-Weather Network-Ready microLink GRS
- TCP and UDP Power Over Ethernet (POE) connectivity.
- IP67 grade enclosure.
- Dual Dipole Antennas
- Pole Mounting Kit

| Specification | Value |
|------------------------|--------------------|
| Input Power | POE 13W Peak |
| Size | 122x82x60mm |
| Weight | 500 grams |
| Operating Temp | -45 to 70°C |
| Interfaces | |
| User | |
| Protocol | TCP or UDP |
| Control | |
| Protocol | TCP or UDP |
| Timing/Position | |
| Position | Internal |
| Environmental | |
| DO-160G | Temperature Cat B2 |



5.4 Airborne Radio System (ARS)

- Transparent serial user data interface
- Plug and play with Ardupilot PixHawk autopilot
- Dual MMCX antenna connectors
- Supports NMEA/UBX GPS Sensors such as HERE2 and microFYX



USER Interface (top connector)

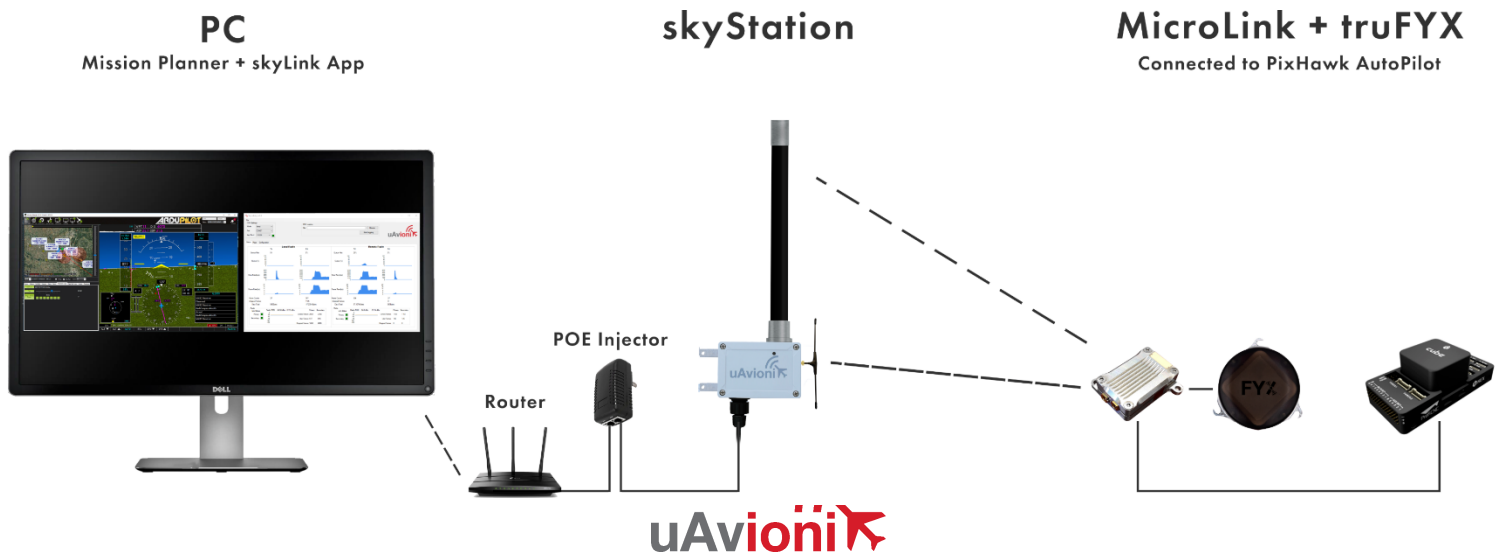
| Pin | Type | Physical | Port |
|-----|------|----------|-------|
| 1 | 5V | 5V | |
| 2 | RXD | IN | Telem |
| 3 | TXD | OUT | Telem |
| 4 | RXD | IN | GPS |
| 5 | PPS | IN | 1PPS |
| 6 | GND | | |

Timing/Position, Control Interface (bottom connector)

| Pin | Type | Physical | Port |
|-----|------|----------|---------|
| 1 | 5V | 5V | |
| 2 | RXD | IN | GPS |
| 3 | UTC | IN | 1PPS |
| 4 | RXD | IN | Control |
| 5 | TXD | OUT | Control |
| 6 | GND | | |

The USER interface is the data connection to the auto pilot. The Control interface is for changing settings like frequency hop tables, serial port parameters, etc.

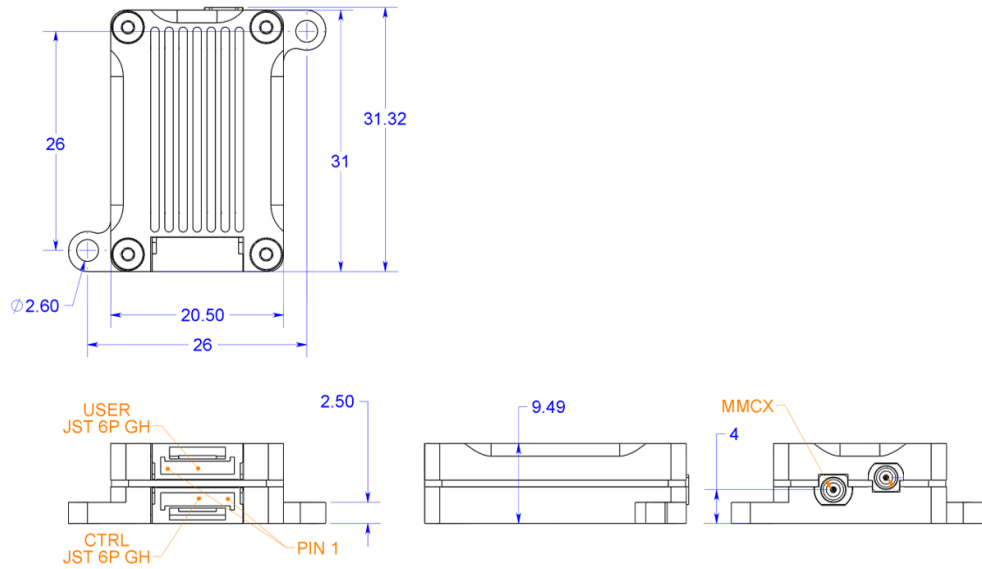
5.5 Typical System Configuration



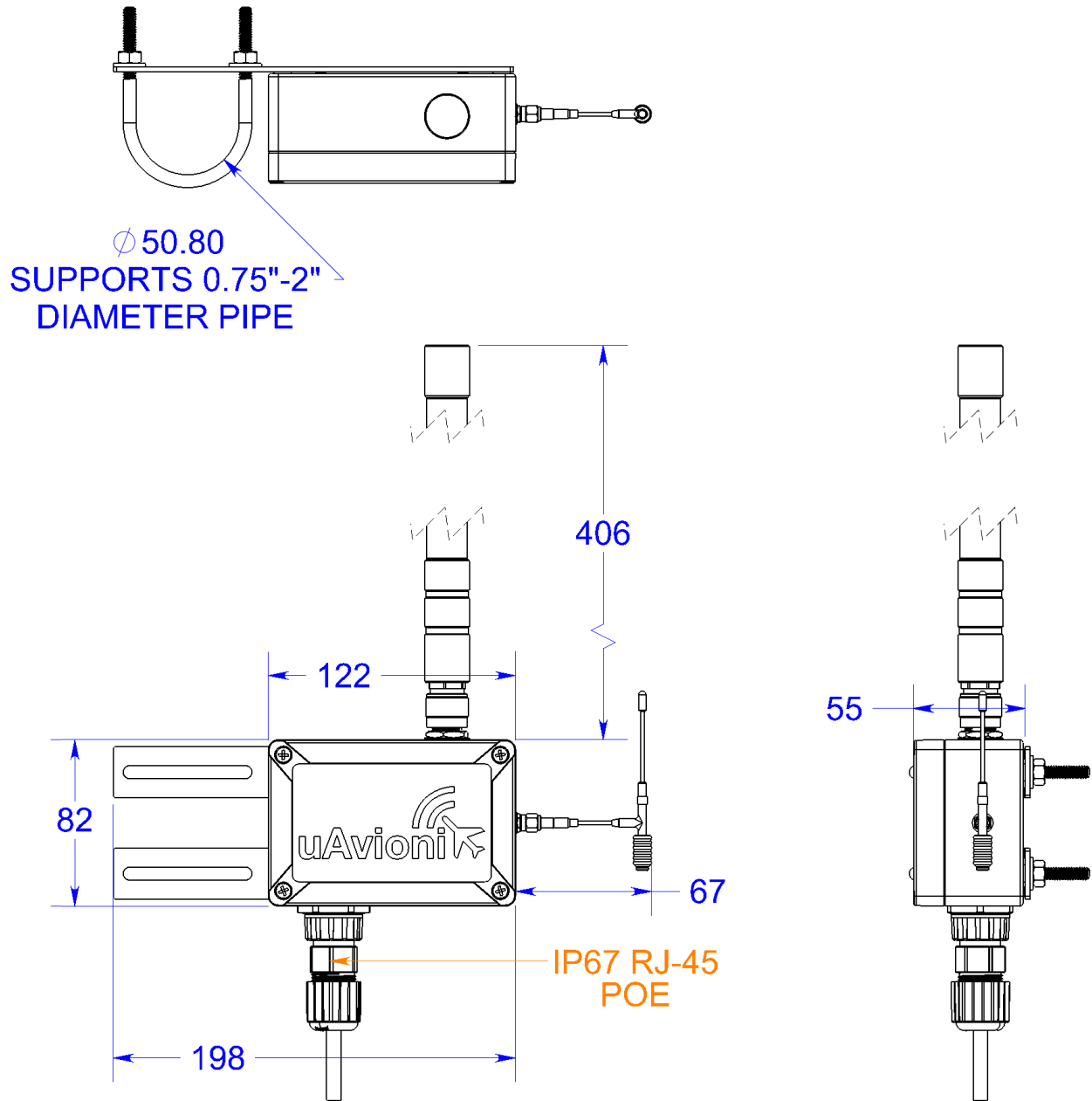
| Ordering Part Numbers | |
|------------------------------|-----------------|
| skyStation | UAV-1003057-001 |
| microLink | UAV-1002868-001 |
| GPS Options | |
| microFYX kit | UAV-1002500-001 |
| HERE2 kit | UAV-1002956-001 |
| Replacement Parts | |
| skyLink Dipole Antenna | UAV-1003060-001 |
| MMCX 100mm | UAV-1003063-001 |
| MMCX 200mm | UAV-1003063-002 |
| GH 6p Cable | UAV-1003061001 |
| GH 8p Cable | UAV-1003062-001 |

5.6 Mechanical Specifications

Airborne Radio System (ARS)



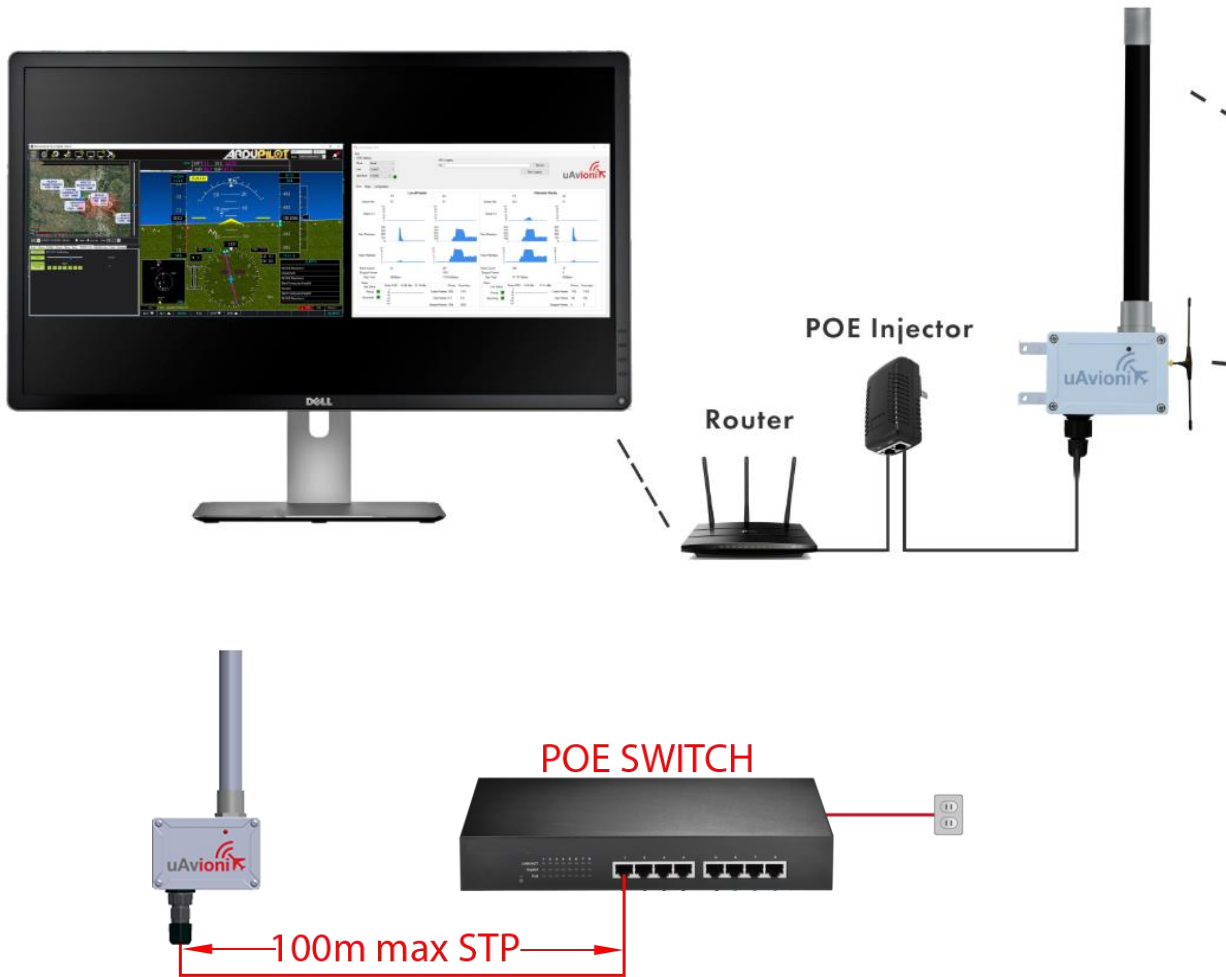
GRS



6 Configuration

6.1 skyStation

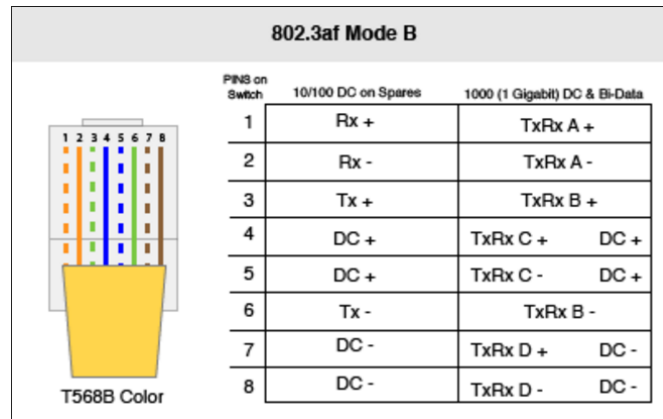
Connect skyStation to a POE switch or POE power injector.



6.2 Connection to the POE Network

POE Specifications:

| Parameter | Value |
|--------------------------|------------------------------------|
| Standard | 802.3af (802.3at Type1) |
| Maximum power | 15.4W |
| Voltage Range | 37 – 57V |
| Maximum Current | 350mA |
| Maximum Cable Resistance | 20Ω |
| Supported Cabling | Shielded Cat 3 and Shielded Cat 5 |
| Supported Modes | Mode A (endspan), Mode B (midspan) |
| Power Management | Power Class 0 |
| Maximum Cable Length | 100 meters |



Caution!

Absolute maximum DC voltage +57 V. A higher DC voltage value will permanently damage the equipment!

6.3 skyStation Start-up and Connection

To setup the microLink and skyStation quickly with default configuration, see the “microLink Quick Start Guide.pdf”.

6.3.1 Apply POE power to the skyStation

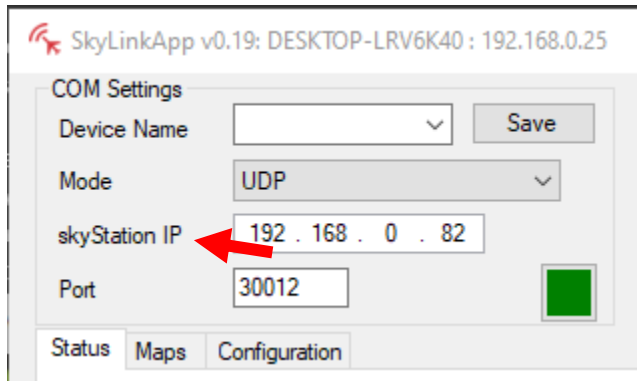
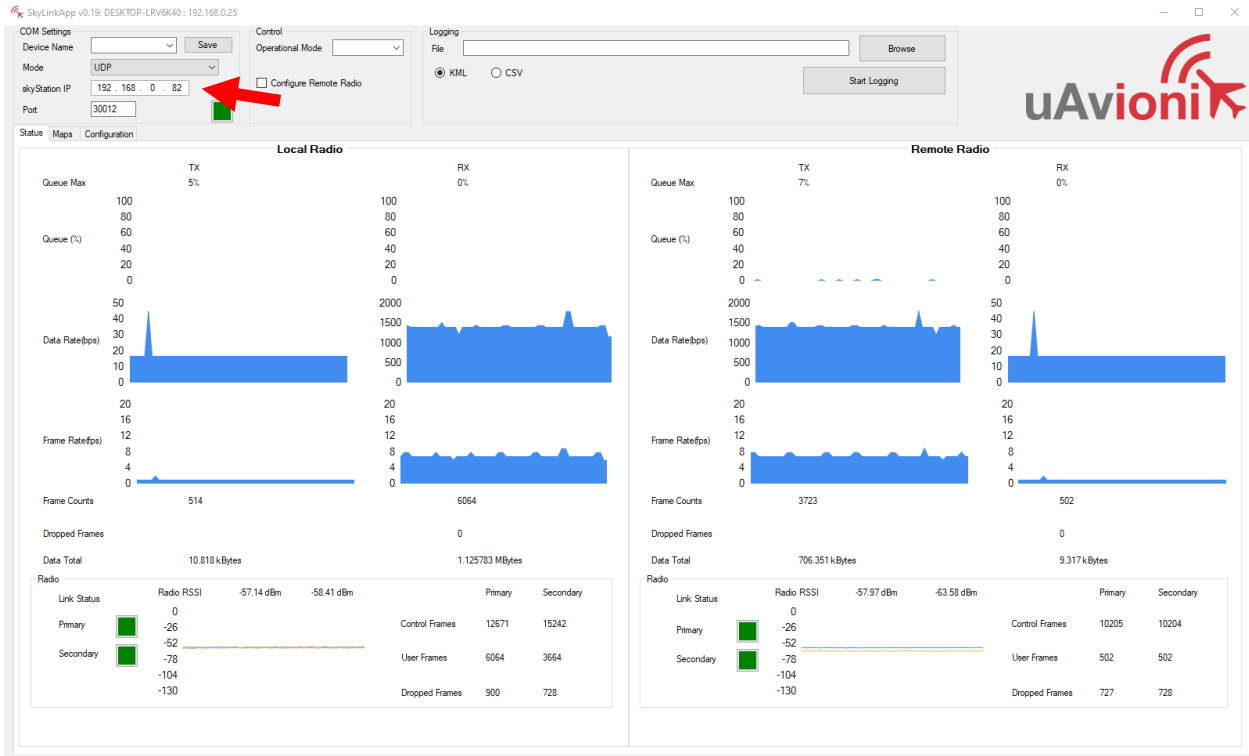
At power-up an IP address will be assigned to the skyStation by the local DHCP server. By default, the skyStation will start broadcasting the Control Channel information on UDP port 30012.

6.3.2 Run skyLinkApp.exe

skyLinkApp.exe will be listening for incoming Control data on UDP port 30012. When the data arrives, skyLinkApp.exe will begin graphing the radio link statistics.

NOTE: If you are not seeing the graphing as shown below it is likely your firewall is blocking the broadcast on port 30012. Please setup your firewall to allow skyLinkApp.exe broadcast access to port 30012.

skyLinkApp.exe will populate the IP address of the skyStation as noted with the red arrow below. This is the IP address of the skyStation which is to be used as the connection point for a ground control station like Mission Planner.



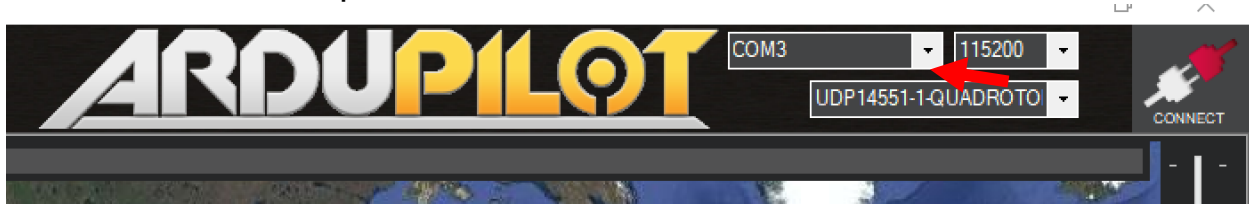
6.3.3 Connect to Mission Planner in TCP mode

Download and install Mission Planner from:

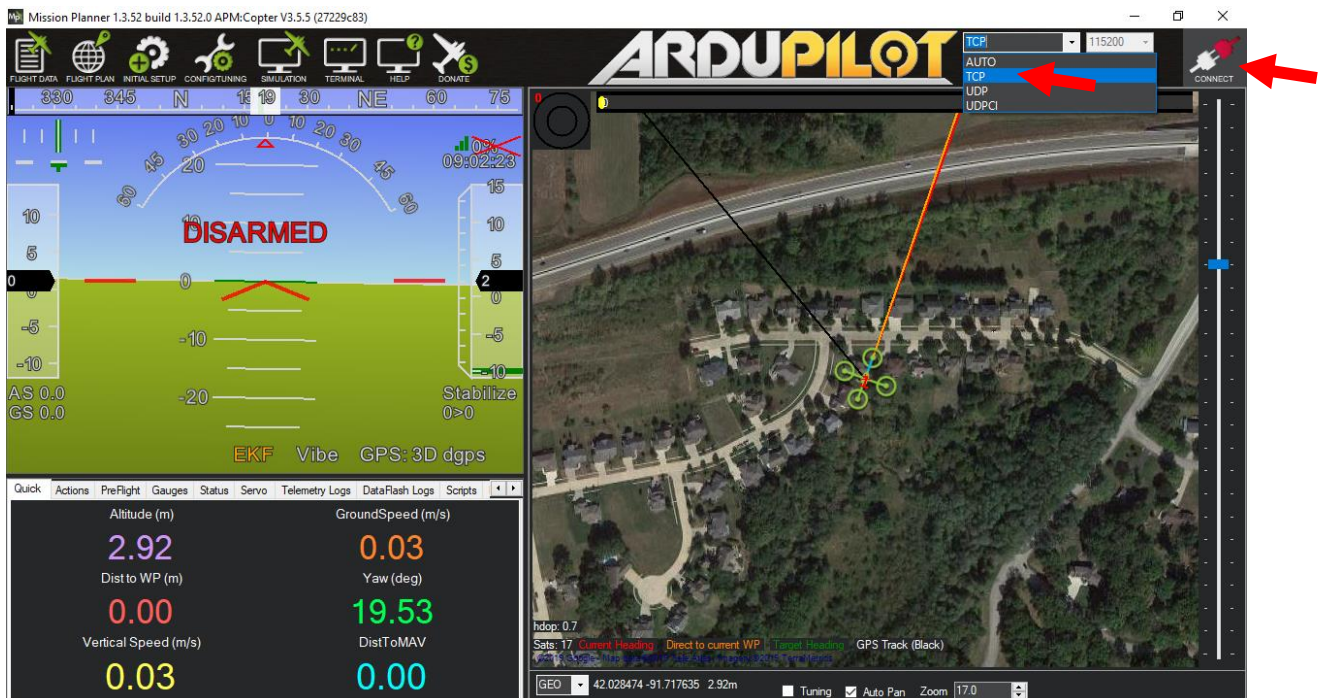
<http://firmware.ardupilot.org/Tools/MissionPlanner/>

<http://ardupilot.org/planner/docs/mission-planner-installation.html>

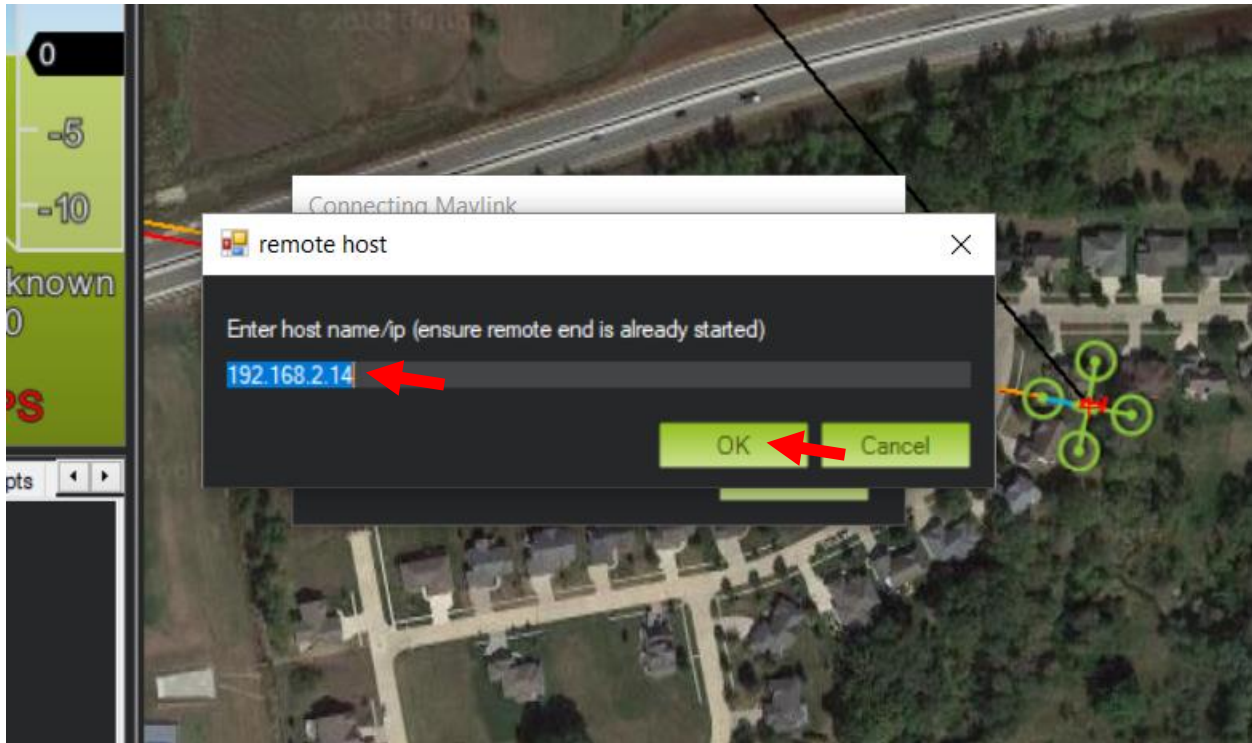
Verify that the flight controller and skyStation are powered and running and that skyLinkApp.exe is receiving data. Run Mission Planner and select the communications drop down menu.



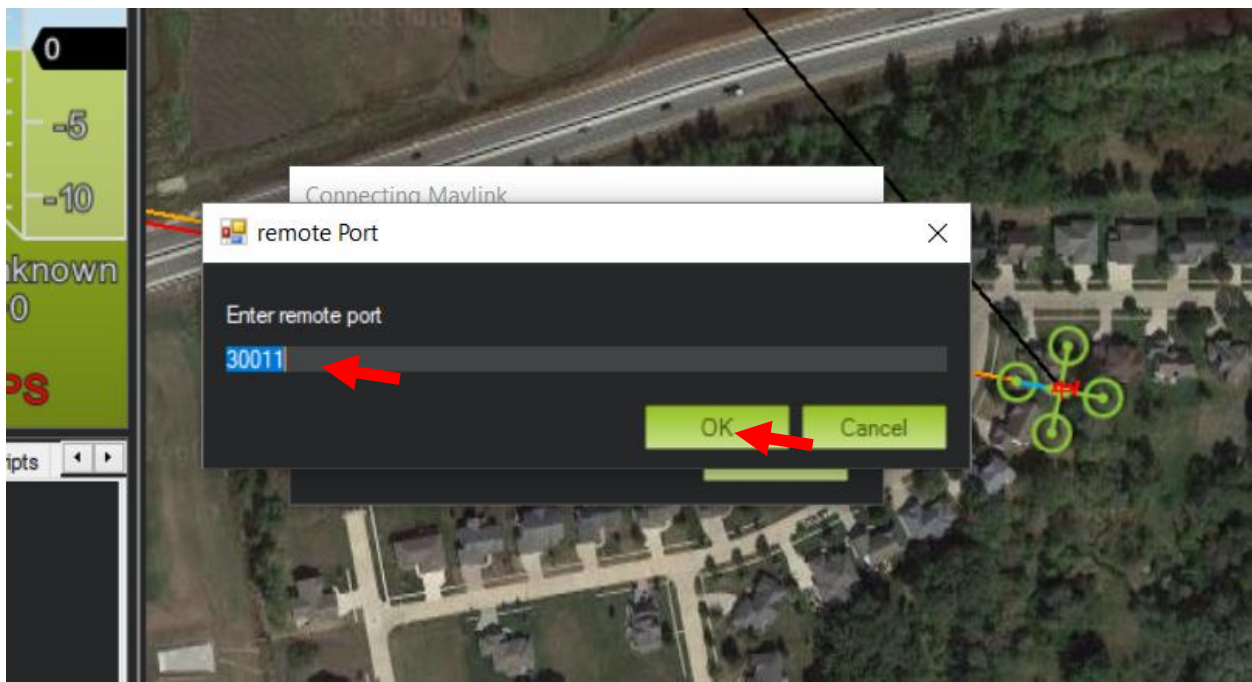
Select TCP as the communication mode and hit the Connect button on the upper right-hand corner.



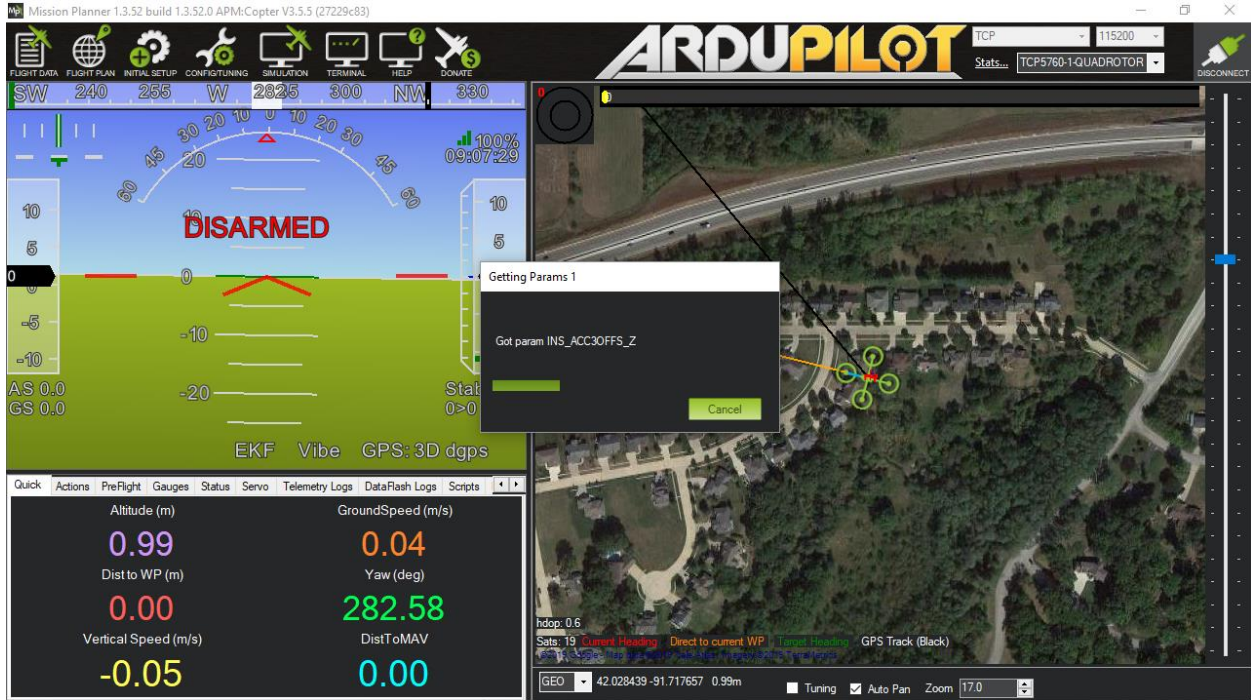
Enter the skyStation IP address as found earlier in skyLinkApp.exe and click OK.



Enter port 30011 which is the skyStation default TCP port for Mission Planner and click OK.



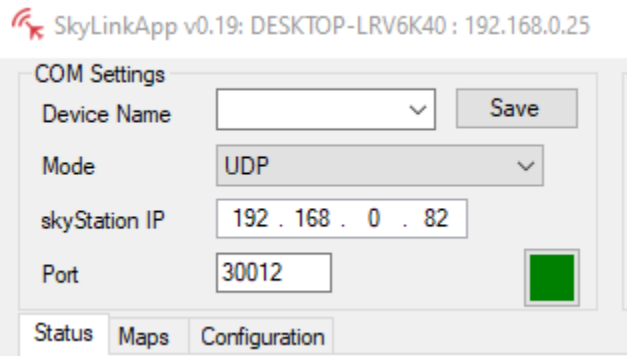
The TCP connection will now take off and you will see the system retrieving parameters as follows for the flight controller.



The skyStation is now in place and ready to host missions.

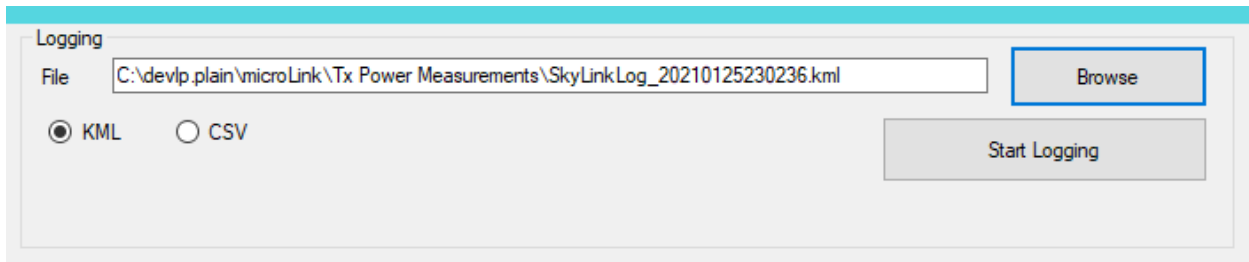
6.3.4 skyLinkApp.exe

skyLinkApp.exe is the uAvionix Control channel monitoring application. It is used for showing Status, Maps and Configuration information. It can be connected to the skyStation in TCP or UCP modes and the ports are configurable for network flexibility. The mode and port selection must match the skyStation Configuration page setup and the IP address is always the IP address of the skyStation.



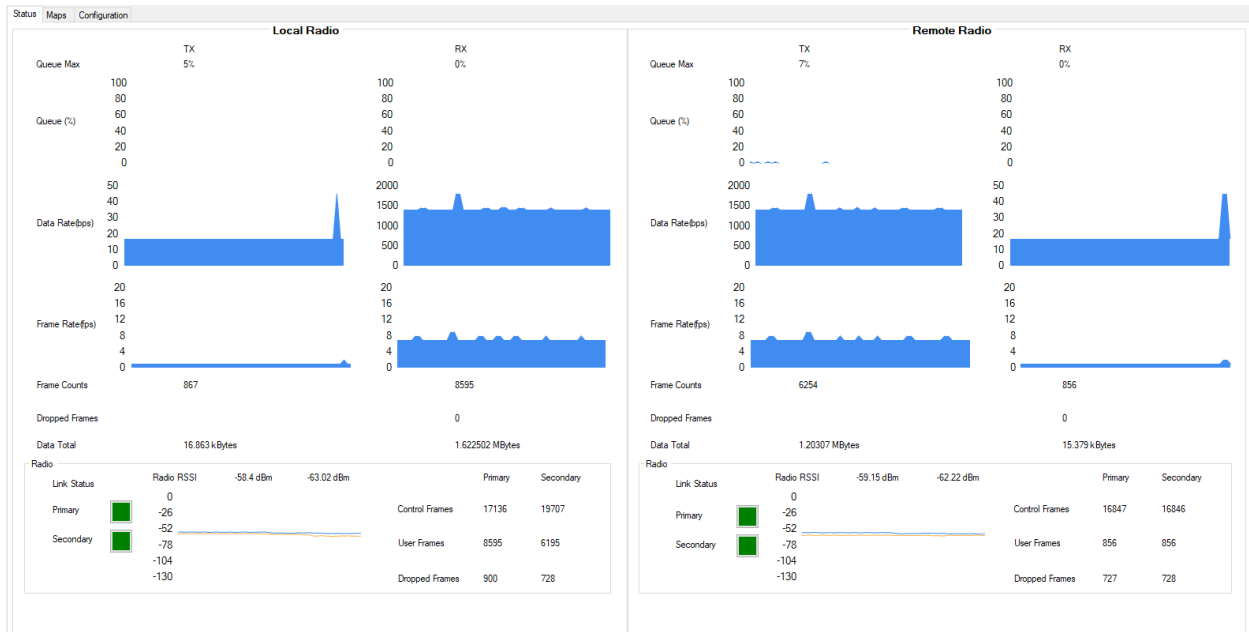
The Device Name field allows the user to enter a name for a set of connection parameters and save them for easy switching between radio connections. Just type in a name and press Save.

There is also a KML logging feature for importation into mapping software. Logging may also be captured in comma separated value (CSV) format.



6.3.5 Status Tab

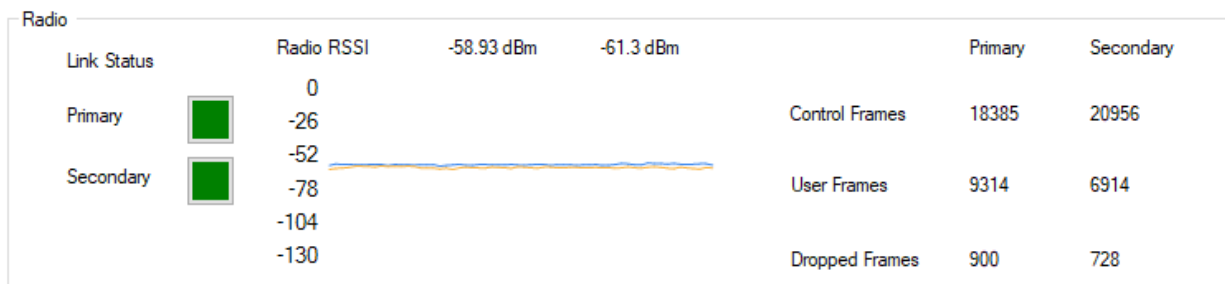
The status data is shown for both the local and the remote radios. It contains both transmit and receive information for the local and remote radios. This information includes memory queue depth information, transmit and receive data rates, frame rates, dropped frames and data totals. It also shows the RSSI's on the primary and secondary radios for both the local and remote radios giving the user comprehensive information on the state of the system.



Radio throughput and statistics detail shown below.

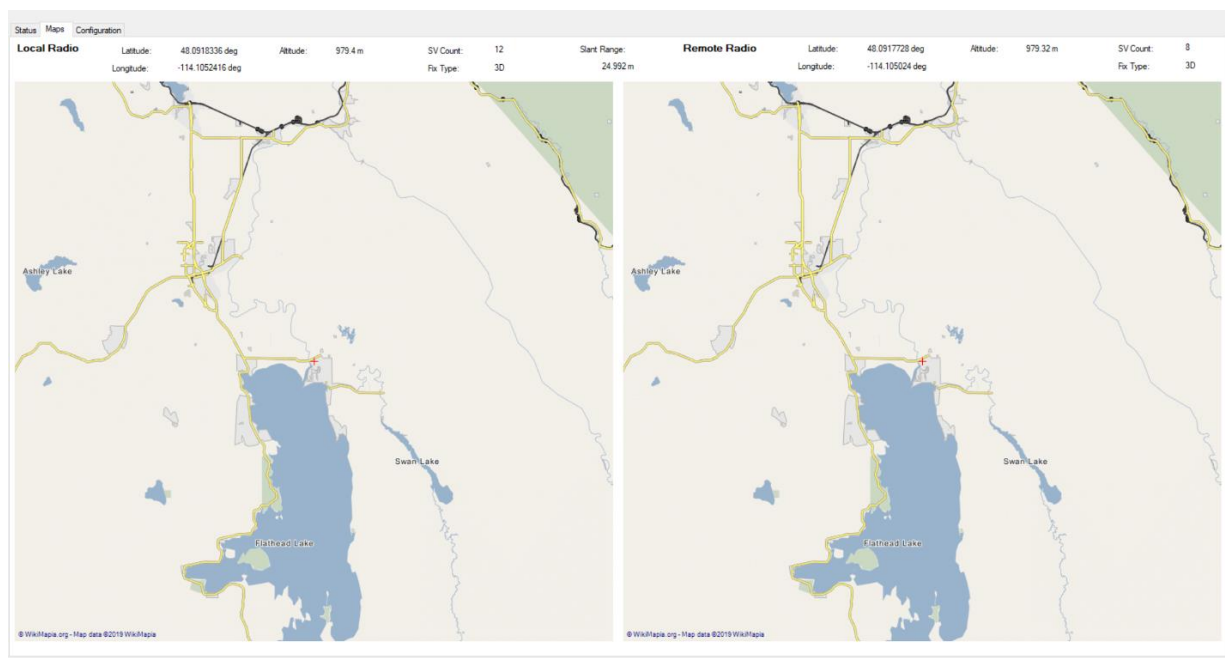


RSSI detail shown below.



6.3.6 Maps Tab

skyLinkApp.exe has a mapping tab for mapping the local radio skyStation radio as well as the remote aircraft radio. It includes latitude, longitude, altitude, GPS fix type, Slant Range and SV count.



6.3.7 Configuration Tab

skyLinkApp.exe also contains a Configuration tab. This tab is used for device settings and setup as well as system selecting the hop table scheme for the system. Hop tables can be read from and written to a file in JSON format. Configuration parameters can be read from and written to a file in JSON format.

The Configuration tab also contains a device identification field. The “Get Device Identification” button will display the Firmware version, CRC, Hardware ID and Serial Number of the directly connected device as well as the remotely connected device, if present.

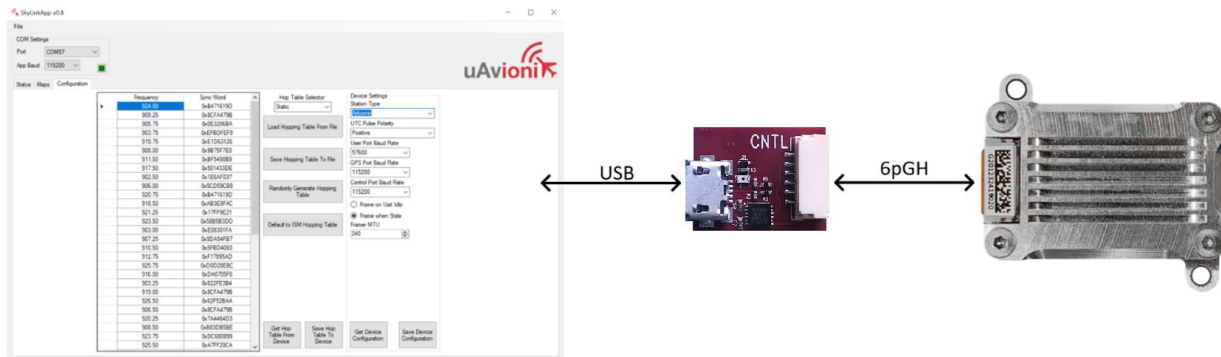
The screenshot shows the Configuration tab of a software interface. It is divided into three main sections:

- Hop Table:** A table with 40 rows (Idx 0-39) and 3 columns (Freq (MHz), Sync Word). The first row (Idx 0) is highlighted in blue. The Sync Word column contains hexadecimal values.
- Configuration Controls:**
 - Use Masked Hop Tables
 - Hop file loaded: N/A
 - Buttons: Load Hop Table From File, Save Hop Table To File, Generate Random Hop Table, Default to ISM Hopping Table.
 - Buttons: Get Hop Table From Device, Save Hop Table To Device.
- Device Configuration:**
 - Station Type: Ground
 - UTC Pulse Polarity: Positive
 - User Port Baud Rate: 921600
 - GPS Port Baud Rate: 115200
 - Control Port Baud Rate: 115200
 - Radio Mode: Frame on Uart Idle, Frame when Stale
 - Framer MTU: 240
 - Buttons: Get Config from Device, Save Config to Device.
 - Config file loaded: N/A
 - Buttons: Load Config from File, Save Config to File.
 - Versions:**
 - Local microLink:
 - Firmware Version: 1.0.4
 - Firmware CRC: 0xE803D807
 - Hardware ID: 0x38
 - Serial Number: 0x1C8CF87D
 - Remote microLink:
 - Firmware Version: 1.0.4
 - Firmware CRC: 0xE803D807
 - Hardware ID: 0x38
 - Serial Number: 0x1C8D1D10
 - Button: Get Device Identification

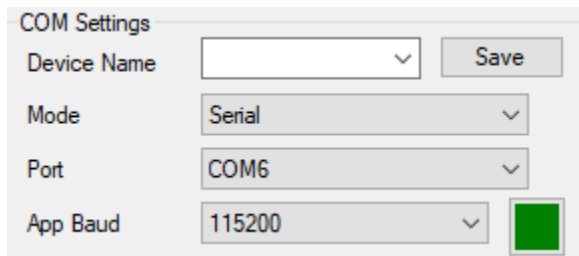
6.3.7.1 Airborne Radio System (ARS) Configuration

Connect the microLink radio to your PC using the USB to serial adapter board marked CNTL. The CNTL board connects to the radio’s bottom connector. Note that a GPS signal is not required to perform configuration operations on the radio.

PC



Select COM Port and set the App Baud to 115200.



On the Configuration Tab:

- Default to ISM Hopping Table
- Save Hop Table to Device
 - Station Type: Airborne (Do not modify)
 - UTC Pulse Polarity: Positive (Do not modify)
 - User Port Baud Rate: 57600
 - GPS Port Baud Rate: 115200 (Do not modify)
 - Control Port Baud Rate: 115200
 - Check Frame When Stale
 - Framer MTU: 240
- Save Device Configuration

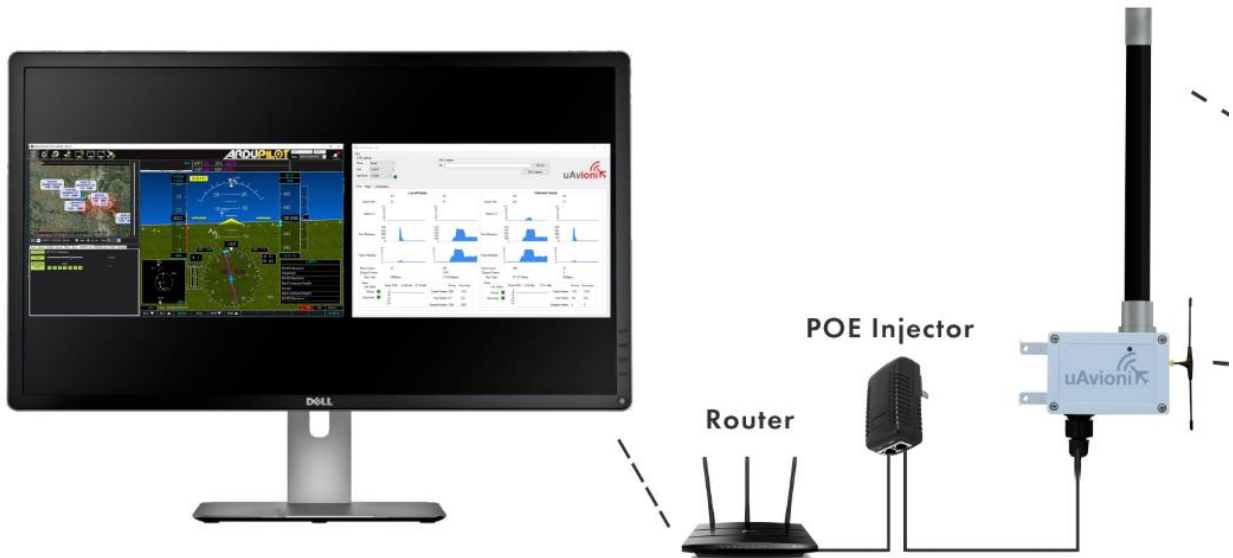
| Idx | Freq (MHz) | Sync Word |
|-----|------------|------------|
| 0 | 924.00 | 0xB471619D |
| 1 | 909.25 | 0x8CFA479B |
| 2 | 905.75 | 0x0E3206BA |
| 3 | 903.75 | 0xEF8DFEF8 |
| 4 | 919.75 | 0xE1D63126 |
| 5 | 908.00 | 0x9B75F7E0 |
| 6 | 911.50 | 0xBF5498B9 |
| 7 | 917.50 | 0x501433DE |
| 8 | 902.50 | 0x1E6AF037 |
| 9 | 906.00 | 0x5CD59CB8 |
| 10 | 920.75 | 0xB471619D |
| 11 | 918.50 | 0xAB3E8FAC |
| 12 | 921.25 | 0x17FF9E21 |
| 13 | 923.50 | 0x58B5B3DD |
| 14 | 903.00 | 0xE08301FA |
| 15 | 907.25 | 0x9DA54FB7 |
| 16 | 910.50 | 0x5FBD4093 |
| 17 | 912.75 | 0xF17895AD |
| 18 | 925.75 | 0xD0D28EBC |
| 19 | 916.00 | 0xDA6705F6 |
| 20 | 903.25 | 0x822FE3B4 |
| 21 | 919.00 | 0x8CFA479B |
| 22 | 926.50 | 0x62F52BAA |
| 23 | 906.50 | 0x8CFA479B |
| 24 | 920.25 | 0x7A4464D3 |
| 25 | 908.50 | 0xB83DB5BE |
| 26 | 923.75 | 0xDC680899 |

Use Masked Hop Tables
 Hop file loaded: N/A

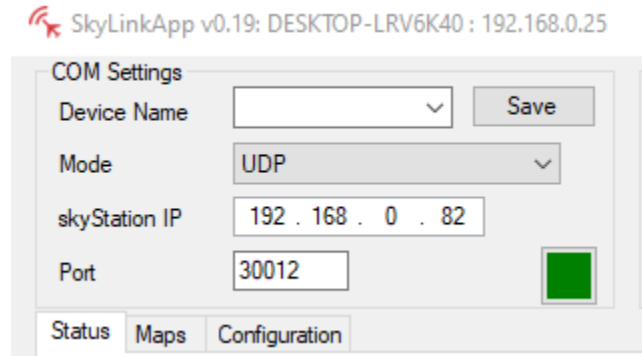
Device Configuration
 Station Type: Airborne
 UTC Pulse Polarity: Positive
 User Port Baud Rate: 57600
 GPS Port Baud Rate: 115200
 Control Port Baud Rate: 115200
 Frame on Uart Idle
 Frame when Stale
 Framers MTU: 240

6.3.7.2 Ground Radio System (GRS) Configuration

Connect as shown below then run the skyLinkApp.



Select Port and set UDP / TCP as configured.



On the Configuration Tab:

- Default to ISM Hopping Table
- Save Hop Table to Device
 - Station Type: Ground (Do not modify)
 - UTC Pulse Polarity: Positive (Do not modify)
 - User Port Baud Rate: 57600
 - GPS Port Baud Rate: 115200 (Read only)
 - Control Port Baud Rate: 115200 (Read only)
 - Check Frame When Stale
 - Framers MTU: 240
- Save Device Configuration

Hop Table

| Idx | Freq (MHz) | Sync Word |
|-----|------------|-------------|
| 0 | 924.00 | 0xB471619D |
| 1 | 909.25 | 0x8CFA479B |
| 2 | 905.75 | 0x0E3206BA |
| 3 | 903.75 | 0xEFBDFFEF8 |
| 4 | 919.75 | 0xE1D63126 |
| 5 | 908.00 | 0x9B75F7E0 |
| 6 | 911.50 | 0xBF5498B9 |
| 7 | 917.50 | 0x501433DE |
| 8 | 902.50 | 0x1E6AF037 |
| 9 | 906.00 | 0x5CD59CB8 |
| 10 | 920.75 | 0xB471619D |
| 11 | 918.50 | 0xAB3E8FAC |
| 12 | 921.25 | 0x17FF9E21 |
| 13 | 923.50 | 0x58B5B3DD |
| 14 | 903.00 | 0xE08301FA |
| 15 | 907.25 | 0x9DA54FB7 |
| 16 | 910.50 | 0x5FBD4093 |
| 17 | 912.75 | 0xF17895AD |
| 18 | 925.75 | 0xD0D28EBC |
| 19 | 916.00 | 0xDA6705F6 |
| 20 | 903.25 | 0x822FE3B4 |
| 21 | 919.00 | 0x8CFA479B |
| 22 | 926.50 | 0x62F52BAA |
| 23 | 906.50 | 0x8CFA479B |
| 24 | 920.25 | 0x7A4464D3 |
| 25 | 909.50 | 0x8CFA479B |

Device Configuration

Station Type: Ground

UTC Pulse Polarity: Positive

User Port Baud Rate: 921600

GPS Port Baud Rate: 115200

Control Port Baud Rate: 115200

Frame on Uart Idle
 Frame when Stale

Framer MTU: 240

Config file loaded: N/A

Use Masked Hop Tables

Hop file loaded: N/A

6.3.7.3 Hop Masking

The radio can be configured to not transmit and/or not receive on a given hop. To enable the controls for this feature, check the “Use Masked Hop Tables” checkbox on the configuration tab.

Hop Table

| Idx | Freq (MHz) | Sync Word | Tx Enabled | Rx Enabled |
|-----|------------|------------|-------------------------------------|-------------------------------------|
| 0 | 924.00 | 0xB471619D | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 | 909.25 | 0x8CFA479B | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 | 905.75 | 0x0E3206BA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 | 903.75 | 0xEFBDFEF8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 | 919.75 | 0xE1D63126 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 | 908.00 | 0x9B75F7E0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | 911.50 | 0xBF5498B9 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7 | 917.50 | 0x501433DE | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 8 | 902.50 | 0x1E6AF037 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 9 | 906.00 | 0x5CD59CB8 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 10 | 920.75 | 0xB471619D | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 11 | 918.50 | 0xAB3E8FAC | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 12 | 921.25 | 0x17FF9E21 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 13 | 923.50 | 0x58B5B3DD | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 14 | 903.00 | 0xE08301FA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 15 | 907.25 | 0x9DA54FB7 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 16 | 910.50 | 0x5FBD4093 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 17 | 912.75 | 0xF17895AD | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 18 | 925.75 | 0xD0D28EBC | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 19 | 916.00 | 0xDA6705F6 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 20 | 903.25 | 0x822FE3B4 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 21 | 919.00 | 0x8CFA479B | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 22 | 926.50 | 0x62F52BAA | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 23 | 906.50 | 0x8CFA479B | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 24 | 920.25 | 0x7A4464D3 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Use Masked Hop Tables

Hop file loaded: N/A

Load Hop Table From File

Save Hop Table To File

Generate Random Hop Table

Default to ISM Hopping Table

Tx Mask Ops

Disable All

Disable Odd

Disable 2/3

Invert

Get Hop Table From Device

Rx Mask Ops

Disable All

Disable Odd

Disable 2/3

Invert

Save Hop Table To Device

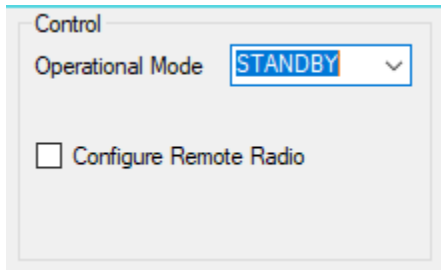
Two new columns, Tx Enabled and Rx Enabled will appear and 8 new buttons for mask manipulation will appear.

To select which hops to enable or disable, simply check or uncheck the check box in the Hop Table. The buttons provide useful shortcuts to speed up the manipulation of all 50 hops. Once the selection is final, press “Save Hop Table to Device” to save it in non-volatile memory on the device. To save a hop table that will be applied to multiple devices, press “Save Hop Table to File”. To recall a saved hop table, press “Load Hop Table From File”. Note that pressing “Save Hop Table To Device” is required to push a loaded hop table to the device.

6.3.7.4 Standby and Active

To place the radio into a non-transmitting state, use the “Operational Mode” input box in the Control section at the top of skyLinkApp to select

‘STANDBY’. This causes the radio to stop all transmissions indefinitely. To return to normal operation, choose ‘ACTIVE’. By default, the input box is empty and when skyLinkApp launches it leaves the current ACTIVE/STANDBY state untouched. Note that the Hop Table masking will return to its saved configuration when returning to ACTIVE from STANDBY.



6.3.7.5 Remote Configuration

Over the air or Remote Configuration is possible. This may be useful when the airborne radio is installed on an aircraft and it is difficult to remove it for configuration. To use the Remote Configuration feature first establish an RF link between the air and ground radios. In the COM Settings box, select a connection to the skyStation. With the skyStation connection established, check the “Configure Remote Radio” box in the Control section.

Parameters that can be configured remotely will be highlighted in a sky-blue color. Note that the operational mode of the remote radio can be changed as well. Also note that some configuration changes will cause the RF link to be lost so it is not recommended to use this feature during flight.

6.4 skyStation Configuration and Health Webpage

skyLinkApp.exe will give the IP address of the skyStation. The skyStation IP address can be also be determined without skyLinkApp.exe by accessing the local DHCP server and reviewing the connected devices or by using industry accepted network scanning tools. Directions for each DHCP server, router, or network scanning tool differ. Refer to the instruction manual for these devices or tools to help determine the IP address assigned to the skyStation. The MAC address for each skyStation can be found on the device housing.

The following pages can be viewed in your web browser.

Note 192.168.0.82 is an example IP address of the skyStation. You must replace this address with the skyStation IP address as assigned on your network.

- skyStation base URL:

<http://192.168.0.82/>

Displays Health statistics, position and version information. Use to program the target UDP address and Port number.

- skyStation status URL:

<http://192.168.0.82/api/v1/stats>

Displays the status json sentence.

- skyStation update URL:

<http://192.168.0.82/update>

Interface to update skyStation firmware.

The base URL displays configuration items as well as dynamic skyStation health statistics. The defaults for the User and Control channel connections is shown. All parameters can also be modified to fit your network needs.



Configuration

User Connection Type: UDP TCP

User UDP IP Address:

User UDP Port:

User TCP IP Address: (0.0.0.0 for TCP Server)

User TCP port:

Control Connection Type: UDP TCP

Control UDP IP Address:

Control UDP Port:

Control TCP IP Address: (0.0.0.0 for TCP Server)

Control TCP port:

Static IP Address: (0.0.0.0 for DHCP)

Subnet Mask:

Gateway IP Address:

DNS Address:

Reset Factory Defaults: RESET

Health

User Serial Total KB Received: 7884 User Serial Bytes/s: 2240 User TCP Bytes Received: 81547 User UDP Bytes Received: 0

Control Serial Total KB Received: 1177 Control Bytes/s: 342 Control TCP Bytes Received: 0 Control UDP Bytes Received: 0

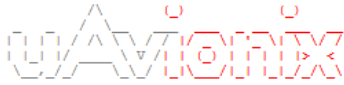
TCP Received: 14030 TCP Transmit: 6644 TCP Drops: 245

Free Space: 29992 Allocated Space: 15064

Version: 0.1.1

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Figure 6-1 Default skyStation Settings



Configuration

User Connection Type: UDP TCP

User UDP IP Address:

User UDP Port:

User TCP IP Address: (0.0.0.0 for TCP Server)

User TCP port:

Control Connection Type: UDP TCP

Control UDP IP Address:

Control UDP Port:

Control TCP IP Address: (0.0.0.0 for TCP Server)

Control TCP port:

Static IP Address: (0.0.0.0 for DHCP)

Subnet Mask:

Gateway IP Address:

DNS Address:

Reset Factory Defaults: RESET

[Update](#)

Health

User Serial Total KB Received: 54 User Serial Bytes/s: 0 User TCP Bytes Received: 15392 User UDP Bytes Received: 40451

Control Serial Total KB Received: 1404 Control Bytes/s: 341 Control TCP Bytes Received: 43 Control UDP Bytes Received: 0

TCP Received: 24117 TCP Transmit: 21167 TCP Drops: 10

Free Space: 29704 Allocated Space: 15352

Version: 0.1.3

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Figure 6-2 Typical skyStation Settings

6.4.1 Configuration Items

| Configuration Item | Description |
|----------------------|---|
| User Connection Type | These checkboxes indicate a connection type of UDP or TCP to the skyStation on the User connection. The default User connection setting is TCP. The User connection is typically a connection between the aircraft and the ground station software. |

| Configuration Item | Description |
|---------------------------|---|
| User UDP IP Address | When the User Connection Type is UDP, this parameter is the IP address of the computer running the ground control software. UDP datagrams will be sent by the skyStation to the IP address specified in this field. The default value for this parameter is the broadcast address 255.255.255.255. This facilitates data delivery with minimal configuration. |
| User UDP Port | When the User Connection Type is UDP, this is the port number used for the User connection. Typically, the ground control software uses the user connection to communicate with the aircraft. The skyStation listens on this port and forwards any received UDP datagrams from ethernet to the aircraft. Any User connection data coming from the aircraft will be sent as an ethernet UDP datagram to [User UDP IP Address : User UDP Port]. The default User UDP port is 30010. |
| User TCP IP Address | When the User Connection Type is TCP, this parameter is used for the User connection to the ground station software. There are two modes of operation available. When this parameter is 0.0.0.0, the skyStation will act as a TCP server and listen for incoming connections. Alternatively, if this address is a valid IP address, the skyStation will act as a TCP client and will attempt to connect to a TCP server listening on [User TCP IP Address : User TCP Port]. 0.0.0.0 is the default setting for this parameter. |
| User TCP Port | When the User Connection Type is TCP, this is the port the TCP server listens on for incoming connections if configured as a server. Alternatively, it will be the port skyStation attempts to connect to if configured as a client (see User TCP IP address). The default User TCP port is 30011. Use care if choosing a different port number than the default so as to not conflict with other TCP services provided by the skyStation. |
| Control Connection Type | These checkboxes indicate a Control connection type of UDP or TCP to the skyStation. The default setting is UDP. The Control connection is typically a connection between the skyStation and a computer running aircraft ground configuration and health software such as skyLinkApp.exe. |
| Control UDP IP Address | When the Control Connection Type selected is UDP, this is the IP address of the computer running ground configuration and health software. UDP datagrams will be sent by skyStation to the IP address specified in this field. The default setting for this parameter is |

| Configuration Item | Description |
|------------------------|--|
| | 255.255.255.255 which results in data being broadcast to facilitate automatic discovery with skyLinkApp. If you do not wish to use broadcast, set this parameter equal to the IP address of the computer running skyLinkApp. |
| Control UDP Port | When the Control Connection Type is UDP, this is the port used by skyStation to listen for control data coming from skyLinkApp. skyStation will use [Control UDP IP Address : Control UDP Port] as the destination for control data going from skyStation to skyLinkApp. skyLinkApp must be configured with [skyStation IP Address : Control UDP Port] in the COM settings box in order to communicate with skyStation. The default value for this parameter is 30012. |
| Control TCP IP Address | When the Control Connection Type is TCP, this is the IP address of the computer running ground configuration and health software. There are two modes of operation available. When this parameter is 0.0.0.0, the skyStation will act as a TCP server and listen for incoming connections. Alternatively, if this address is a valid IP address, the skyStation will act as a TCP client and will attempt to connect to a TCP server listening on [Control TCP IP Address : Control TCP Port]. 0.0.0.0 is the default setting for this parameter. When using skyLinkApp, this parameter must be set to 0.0.0.0. |
| Control TCP Port | When the Control Connection Type is TCP, this is the port the TCP server listens on for incoming connections if configured as a server. Otherwise, it will be the port skyStation attempts to connect to if configured as a client (see Control TCP IP address). The default Control TCP port is 30013. Use care if choosing a different port number than the default so as to not conflict with other TCP services provided by the skyStation. If using a TCP Control Connection, skyLinkApp must be configured with [skyStation IP Address : Control TCP Port] in the COM settings box in order to communicate with skyStation. |
| Static IP Address | This is the fixed IP address number of the skyStation which will not change. The network administrator may assign this number. Set this field to 0.0.0.0 to enable DHCP. |
| Subnet Mask | Mask used with the skyStation IP address to differentiate between local and remote subnet destinations. |
| Gateway IP Address | Address used to send packets out of the local network. |

| Configuration Item | Description |
|------------------------|--|
| DNS Address | IP address of the Domain Name Service. |
| Reset Factory Defaults | By checking this box and hitting the Update button, all connection types, IP Addresses and ports will be restored to the factory default. This function also performs a system reset. The screenshot above documents the factory default settings. |



When you modify any configuration item, press the Update button to store the changes. These fields are non-volatile and persist through power cycles.

6.4.2 Health

The Health section shows real time statistics updated once every 2 seconds. It will show if the skyStation is sending and receiving serial data and at what rates. It shows TCP/IP stack health and diagnostic data as well as global memory usage data statistics.



Configuration

User Connection Type: UDP TCP

User UDP IP Address:

User UDP Port:

User TCP IP Address: (0.0.0.0 for TCP Server)

User TCP port:

Control Connection Type: UDP TCP

Control UDP IP Address:

Control UDP Port:

Control TCP IP Address: (0.0.0.0 for TCP Server)

Control TCP port:

Static IP Address: (0.0.0.0 for DHCP)

Subnet Mask:

Gateway IP Address:

DNS Address:

Reset Factory Defaults: RESET

Health

User Serial Total KB Received: 7884 User Serial Bytes/s: 2240 User TCP Bytes Received: 81547 User UDP Bytes Received: 0

Control Serial Total KB Received: 1177 Control Bytes/s: 342 Control TCP Bytes Received: 0 Control UDP Bytes Received: 0

TCP Received: 14030 TCP Transmit: 6644 TCP Drops: 245

Free Space: 29992 Allocated Space: 15064

Version: 0.1.1

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| Statistic | Description |
|-------------------------------|---|
| User Serial Total KB Received | Total number of kilobytes received on the User serial channel |
| User Serial Bytes/s | Instantaneous bytes per second on the User serial channel |
| User TCP Bytes Received | Total number of TCP bytes received on the User channel. |
| User UDP Bytes Received | Total number of UDP bytes received on the User channel. |

| | |
|----------------------------------|---|
| Control Serial Total KB Received | Total number of kilobytes received on the User serial channel |
| Control Bytes/s | Instantaneous bytes per second on the Control serial channel |
| Control TCP Bytes Received | Total number of TCP bytes received on the Control channel |
| Control UDP Bytes Received | Total number of UDP bytes received on the Control channel |
| TCP Received | Total number of TCP packets received by the TCP/IP stack |
| TCP Transmit | Total number of TCP packets sent by the stack |
| TCP Drops | Total number of TCP packets dropped by the stack |
| Free Space | Memory free space |
| Allocated Space | Memory used space |
| Version | skyStation software version |

6.5 Updating Devices

The following sections outline the steps to update the firmware on the microLink radios and the skyStation. There are three updating procedures, one for the skyStation firmware, one for the ground-based radio internal to the skyStation, and one for the airborne radio. The firmware image used for the ground-based radio and the airborne radio is the same. You will need to download the PingBootFlasher.exe to update the airborne radio. Updating the skyStation and the ground radio is done via web interface.

6.5.1 Updating skyStation

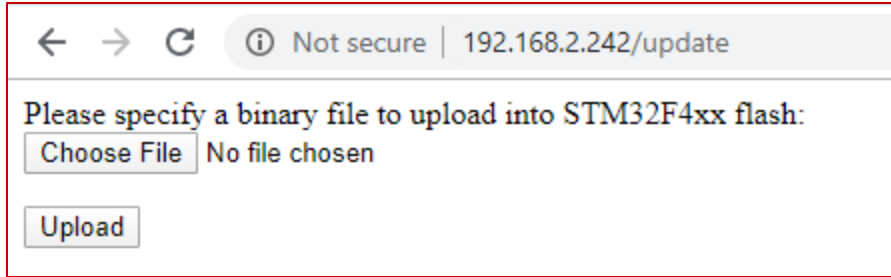
Download and save the “UAV” skyStation firmware image (e.g., UAV-1004343-001-SkyStation-0_1_4-513f8ff.uav) onto a Mac or PC. Use the Chrome web browser. Other web browsers may have compatibility problems.

Connect the skyStation to the network via POE.

If not known, use a network scanning software to find the IP address of the skyStation. The MAC address will be labelled on the bottom of the skyStation.

When the IP address is known, open a web browser and in the URL search bar enter the IP address followed by “/update”

Ex: ###.###.###/update



Select “Choose File” and select the downloaded skyStation firmware. Then click “Upload”

DO NOT DISCONNECT THE SKYSTATION OR CLOSE THE WEB BROWSER UNTIL UPDATE IS COMPLETE

Once file upload is complete click the button that says “Reset MCU”



Once Reset is complete, unplug the skyStation from the POE and plug it back in to finish the update. Follow steps 1-3 to get reconnected the skyStation then go to the main IP page by entering the IP address in the URL search bar.

Ex: ###.###.###

Verify the device version has properly been updated.



Configuration

User Connection Type: UDP TCP

User UDP IP Address:

User UDP Port:

User TCP IP Address: (0.0.0.0 for TCP Server)

User TCP port:

Control Connection Type: UDP TCP

Control UDP IP Address:

Control UDP Port:

Control TCP IP Address: (0.0.0.0 for TCP Server)

Control TCP port:

Static IP Address: (0.0.0.0 for DHCP)

Subnet Mask:

Gateway IP Address:

DNS Address:

Reset Factory Defaults: RESET

Health

User Serial Total KB Received: 0 User Serial Bytes/s: 0 User TCP Bytes Received: 0 User UDP Bytes Received: 0

Control Serial Total KB Received: 10 Control Bytes/s: 340 Control TCP Bytes Received: 0 Control UDP Bytes Received: 0

TCP Received: 63 TCP Transmit: 50 TCP Drops: 0

Free Space: 30384 Allocated Space: 14672

Version: 0.1.2

[Read the Copyright](#)

6.5.2 Updating Ground microLink Radio

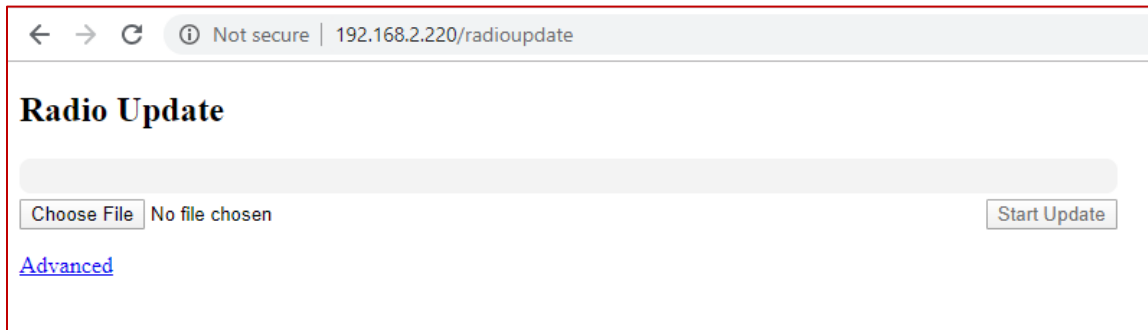
Download and save the most recent microLink “UAV” firmware (e.g., UAV-1004320-001-microLink-1_0_4-09fcfa0.uav) onto a Mac or PC. Use the Chrome web browser. Other web browsers may have compatibility problems.

Connect the skyStation to the network via POE.

If not known, use a network scanning software to find the IP address of the skyStation. The MAC address will be labelled on the bottom of the skyStation.

When the IP address is known, open a web browser and in the URL search bar enter the IP address followed by “/radioupdate”

ex: ###.###.#.###/radioupdate



Select “Choose File” and select the downloaded microLink firmware. Then click “Start Update”

DO NOT DISCONNECT THE SKYSTATION OR CLOSE THE WEB BROWSER UNTIL UPDATE IS COMPLETE

When update is complete you will automatically be directed back to the main status page.

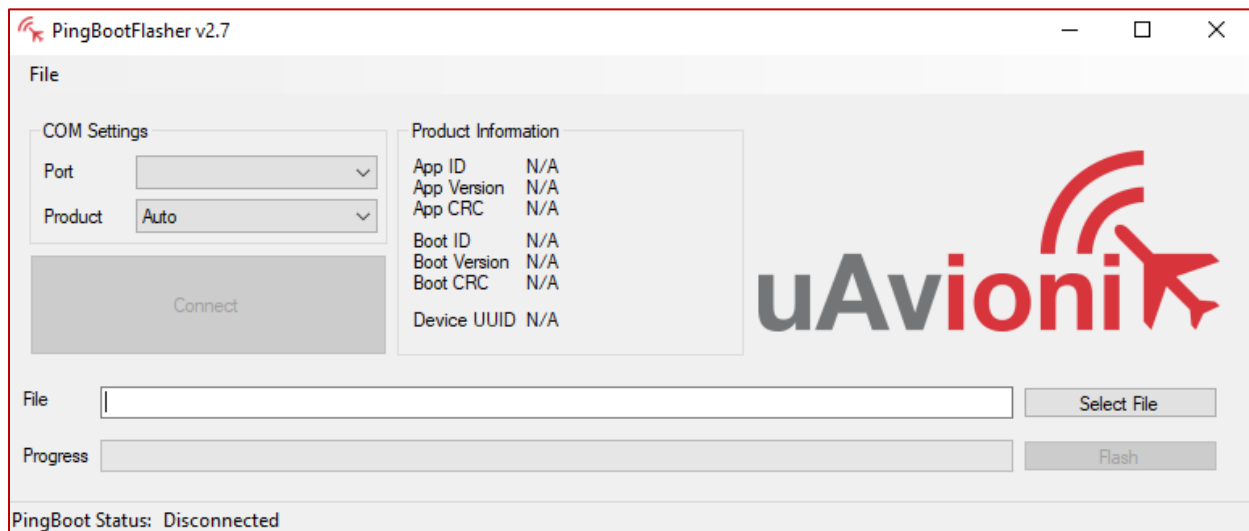
6.5.3 Updating Airborne microLink Radio

Connect the microLink airborne radio to a Mac or PC using the supplied “USER” USB to Serial adapter, 6 pin GH cable, and a micro-USB cable. Connect the microLink radio through the USER port (top connector).

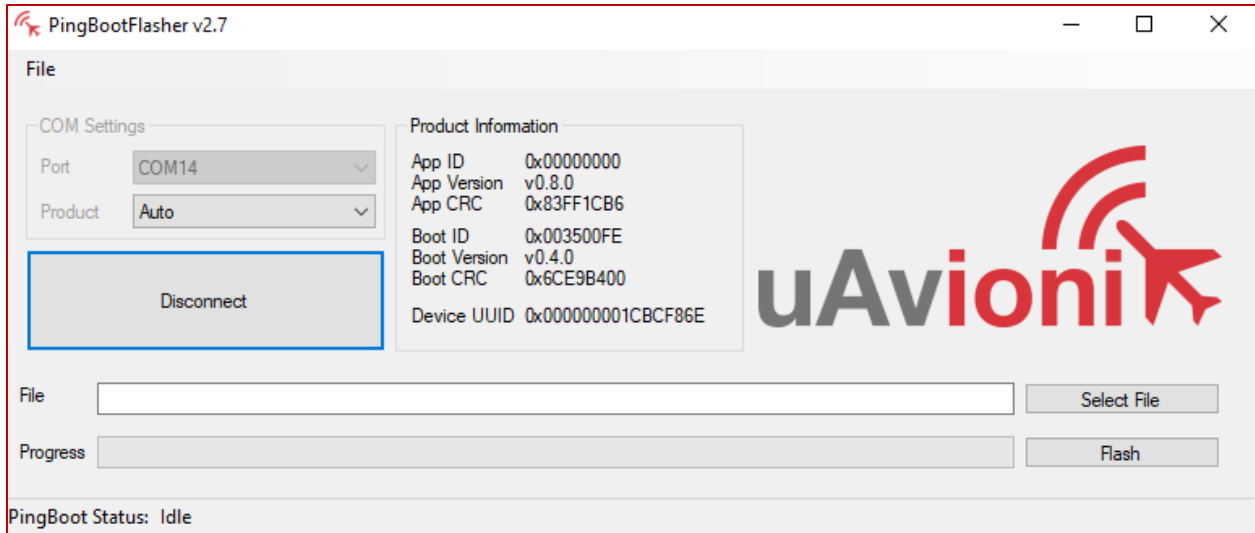


Download the PingBootFlasher (v2.7) software and the most recent microLink firmware onto a Mac or PC.

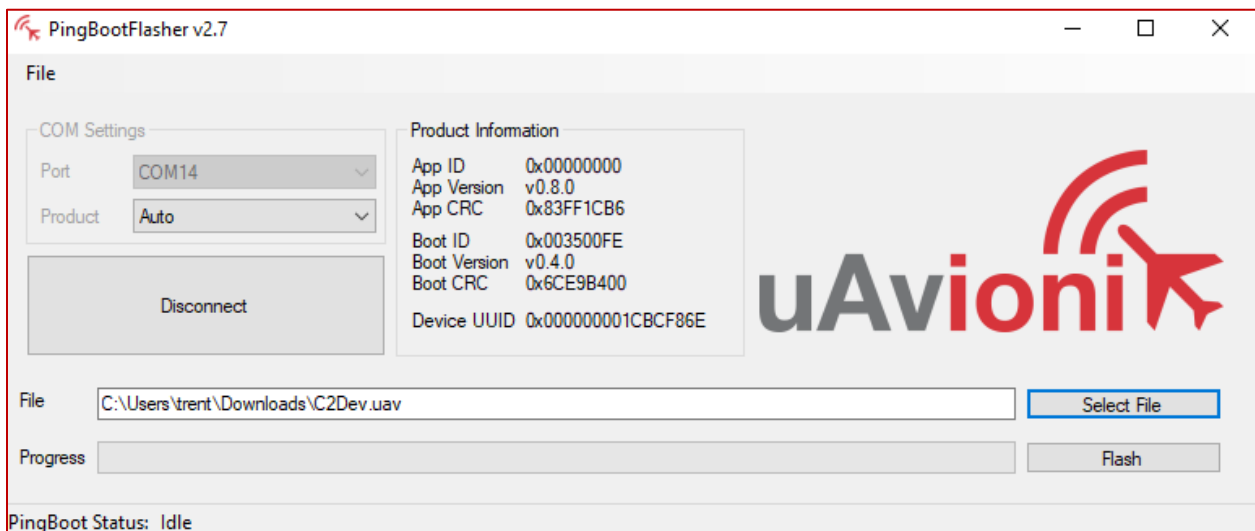
Run the PingBootFlasher software and connect to the microLink radio by selecting the correct COM port on the “Port” dropdown then press connect.



When connected you will see the current App Version and “PingBoot Status: Idle” on the PingBootFlasher software.



Click “Select File” and select the downloaded microLink firmware. Then click “Flash”



DO NOT DISCONNECT THE MICROLINK RADIO OR CLOSE THE PING BOOT FLASHER UNTIL UPDATE IS COMPLETE

When update is complete, unplug the microLink radio and plug it back into the Mac or PC.

Reconnect the PingBootFlasher to the microLink radio and verify the App Version has updated.