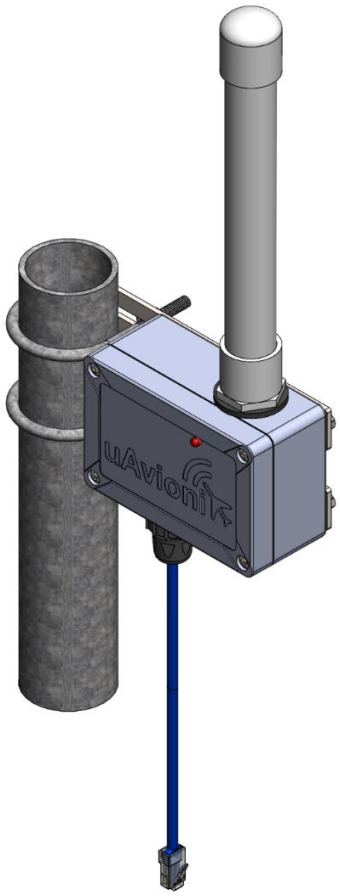
pingStation

User and Installation Guide

REVISION L



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1 Revision History

Revision	Date	Comments
A	1/21/17	Initial release
B	2/13/17	Updated PB
C	7/25/17	Mounting Instructions
D	9/11/17	Added filter functionality
E	11/21/17	Added Hostname and information interval
F	12/21/17	Added Static IP, Subnet, Gateway and DNS
G	1/21/18	Added TCP push for VRS
H	6/8/18	NV parms update and new webpage layout
J	1/8/19	Added ADS-B receiver update process
K	11/11/19	Modify screenshots and instructions VRS setup
L	4/30/2020	Support contact update, mounting description and image update, minor format

2 Warnings / Disclaimers

All device operational procedures must be understood prior to operation.

uAvionix is not liable for damages arising from the use or misuse of this product.

3 Limited Warranty

uAvionix pingStation 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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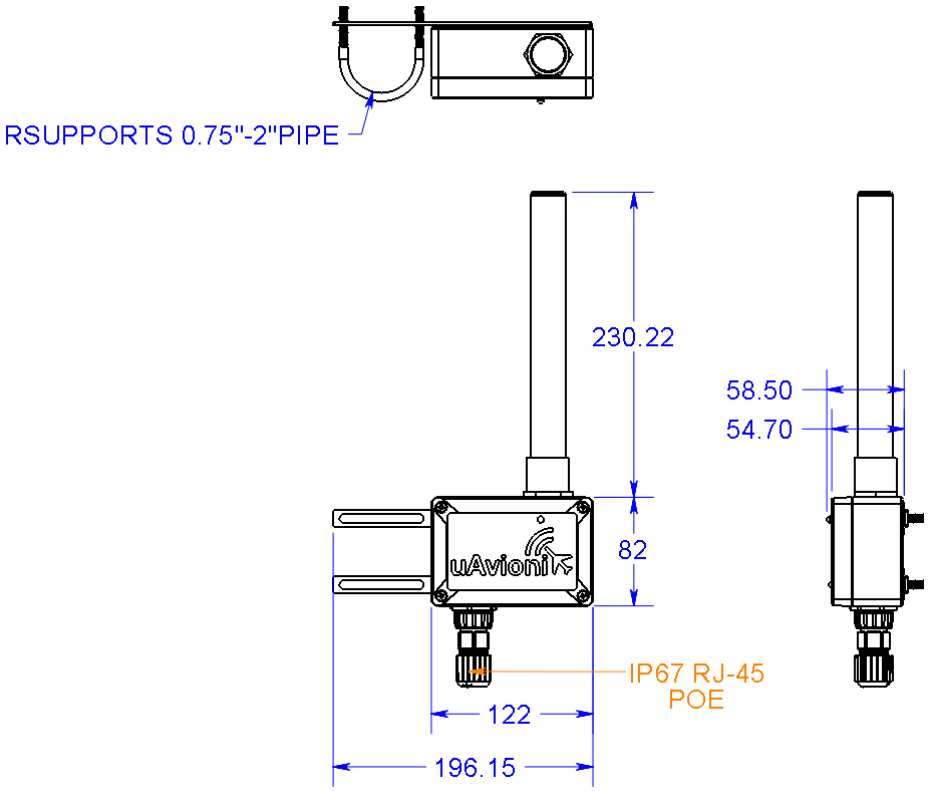
5 Introduction

pingStation is a dual band (978MHz and 1090MHz), networkable ADS-B receiver with a Power-Over-Ethernet (POE) interface enclosed in an IP67 rated protective enclosure. pingStation provides ground surface or low-altitude ADS-B surveillance within line of sight of the antenna, with range dependent upon the output power of the transmitting ADS-B transceiver. pingStation is robust enough to be permanently mounted outdoors in harsh environmental conditions, and small enough to be used as a mobile asset for roaming operations. Installation is simple with included pole-mount bracket, and a single POE cable which provides both power and data communications. Configuration is accomplished via a simple web interface. An integrated GPS provides precision timestamping for messaging.

Multiple pingStations may be networked together to provide a wide area low-altitude surveillance volume. Data messages are in JSON format as described within the pingStation ICD.



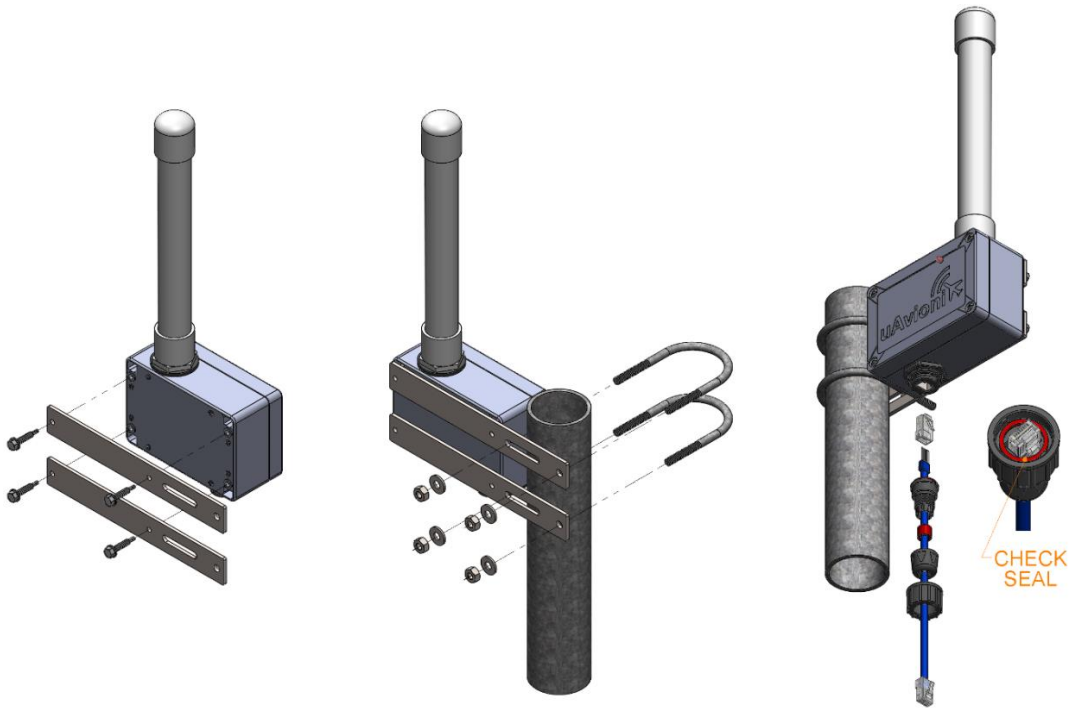
6 Installation

6.1 Mechanical Mounting Recommendations

pingStation is supplied with brackets and ‘u’ blots to mount to poles with a diameter larger than ¾” and smaller than 2”.

After unboxing, screw the four (4) provided self-tapping screws through the holes in the bracket into the holes in the four (4) corners of the back of the pingStation. Use the provided ‘U’ bolts to mount to poles with a diameter larger than ¾” and smaller than 2”. Mount pingStation as high on the pole as possible, preferably at the top with an unobstructed 360° view of the sky.

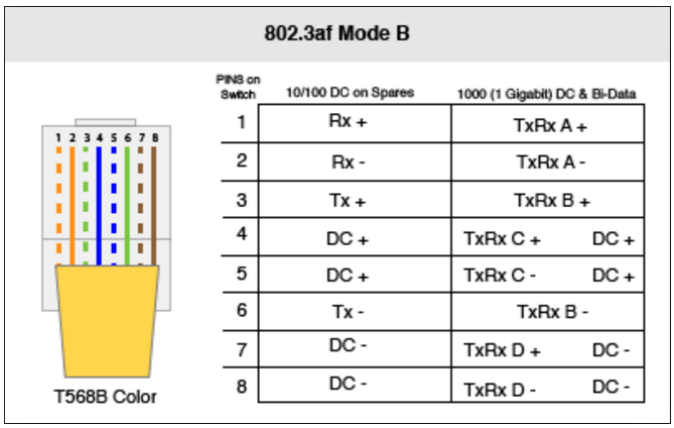
Assemble the IP67 RJ45 connector using Cat5e or better ethernet cable. Pass cable through Large nut, then small nut, then cable seal and finally the connector body. Terminate RJ45 plug onto the cable. Be sure to terminate the RJ45 plug using the same configuration as the other end connecting to the switch/POE injector (T-658A or T-568B). Seat RJ45 plug into top of connector body, then slide the cable seal into place and secure by tightening the small nut. Slide the large nut up into position. Ensure the red Circular seal is in place at the top of the connector main body as shown before connecting to the pingStation. Note: the warranty is void if installed outdoors without this seal.



6.2 Connection to the POE network

POE Specifications:

Parameter	Value
Standard	803.3af (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



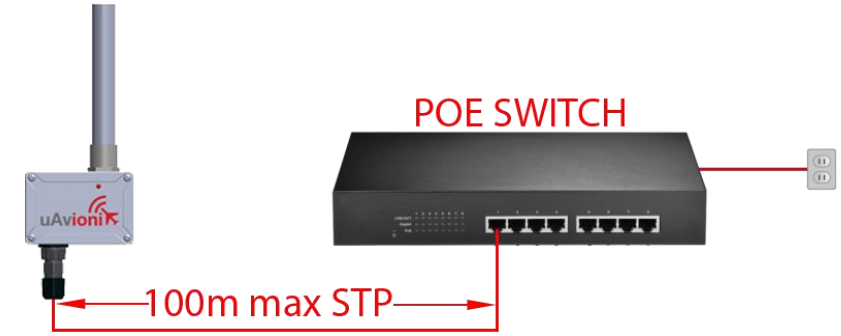
Caution!

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

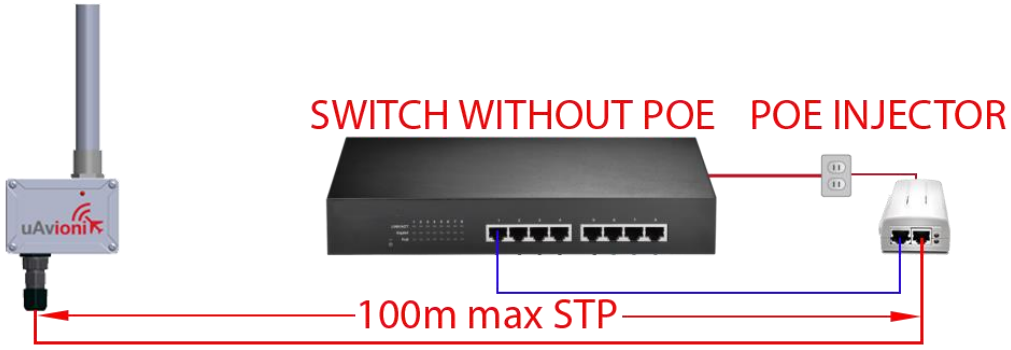
7 Configuration

7.1 Install

Connect the shielded POE cable to an active POE switch or a regular switch via a Class 0 POE power injector as shown below.



pingStation install with POE switch



pingStation install with POE injector

At power-up an IP address will be assigned to the pingStation by the local DHCP server. The pingStation IP address can be determined 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 pingStation. The MAC address for each pingStation can be found on the device housing.

When the pingStation is connected, and powered, the green LED will illuminate. As traffic is decoded by the internal ADS-B receiver, the LED will flash RED.

pingStation base URL:

http://###.###.###.###/

Note ###.###.###.### is the IP address of the device

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

pingStation status URL:

http://###.###.###.###/api/v1/status

Displays the status json sentence/

pingStation traffic URL:

http://###.###.###.###/api/v1/traffic

Displays the current traffic json sentences.

pingStation update URL:

http://###.###.###.###/update

Provides ability to update firmware.

7.2 Connect

The base URL displays configuration items as well as dynamic pingStation statistics.

Configuration

Output Formats:	☐ UDP JSON ☑ TCP Compressed VR
UDP Target IP Address or Hostname:	tracker.uavionix.com
UDP Target Port:	30000
TCP Push IP Address or Hostname:	vrs.uavionix.com
TCP Port:	30010
Altitude Ceiling In Feet:	0 (0 = No Filter)
Max Radius In Miles:	0 (0 = No Filter)
Station Info Interval In Seconds:	30
Static IP Address:	0.0.0.0 (0.0.0.0 for DHCP)
Subnet Mask:	255.255.255.0
Gateway IP Address:	0.0.0.0
DNS Address:	0.0.0.0

Update

Health

UAT Basic: 0
UAT Long: 0
1090 DF17: 29035
1090 DF18: 897
Current Aircraft: 12
GPS Fix Type: 3
GPS Satellites: 9

Latitude: 42.028481 Longitude: -91.717628
Receiver BPS: 921600 GPS BPS: 115200
Version: 1.0.28

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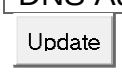
7.2.1 Configuration Items

Configuration Item	Description
Output Formats	The supported delivery formats. Either or both options can be selected.
UDP JSON	Aircraft data will be JSON formatted and pushed out a UDP pipe to the UDP target address on the UDP target port.
TCP Compressed VR	Aircraft data will be Compressed VRS formatted and delivered to a TCP for use with Virtual Radar Server.
UDP Target IP Address or Hostname	The IP address or hostname of the UDP listener on the server.
UDP Target Port	The port number the UDP listener is listening on.
TCP Push IP Address or Hostname	The IP address or hostname that we will be sending TCP data to
TCP Port	If TCP Push IP Address or Hostname is valid this will be the port that we will connect to deliver the compressed VRS tracking data to the push receiver on the other end of the connection. If TCP Push IP Address or Hostname is not valid, this is the port that the TCP server will listen for incoming connections on to deliver the compressed VRS tracking data.
Altitude Ceiling in Feet MSL	Entering a non-zero value will result in a filter which only returns aircraft data below the entered value in feet Mean Sea Level (MSL). Entering a zero results in all aircraft data being returned.
Max Radius in Miles	Entering a non-zero value will result in a filter which only returns aircraft data within the range from the receiver's GPS position in miles specified. Entering a zero results in all aircraft data being returned.
Station Info Interval In Seconds	This is the rate that the pingStation information packet is returned. Mobile pingStations will want a lower number in this field for more regular GPS updates. The default is once every 30 seconds.
Static IP Address	Fixed IP address number of the device which will not change. The network administrator assigns this number. Set this field to 0.0.0.0 to enable DHCP.
Subnet Mask	Mask used to the IP address into network and host address.
Gateway IP Address	Address used to send packets out of the local network.
DNS Address	This is the IP address of the Domain Name Service



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

7.2.2 Health Statistics

Statistic	Description
UAT Basic	The number of UAT basic aircraft messages received.
UAT Long	The number of UAT long aircraft messages received.
1090 DF17	The number of 1090 ADS-B aircraft messages received.
1090 DF18	The number of 1090 TIS-B messages received.
Current Aircraft	The number of aircraft currently being tracked. The aircraft are deprecated from the list after 60 seconds since last contact.
Current Range	The range in miles of the last processed aircraft from the pingStation.
GPS Fix Type	The gps fix type as follows: 0 = Not present 1 = Not locked 2 = 2D fix 3 = 3D fix 4 = Differential GPS fix
GPS Satellites	The number of satellites the pingStation can currently see.
Latitude	The latitude of this pingStation.
Longitude	The longitude of this pingStation.
Receiver BPS	The communication speed to the ping receiver.
GPS BPS	The communication speed to the GPS
Version	The version of software this pingStation running.

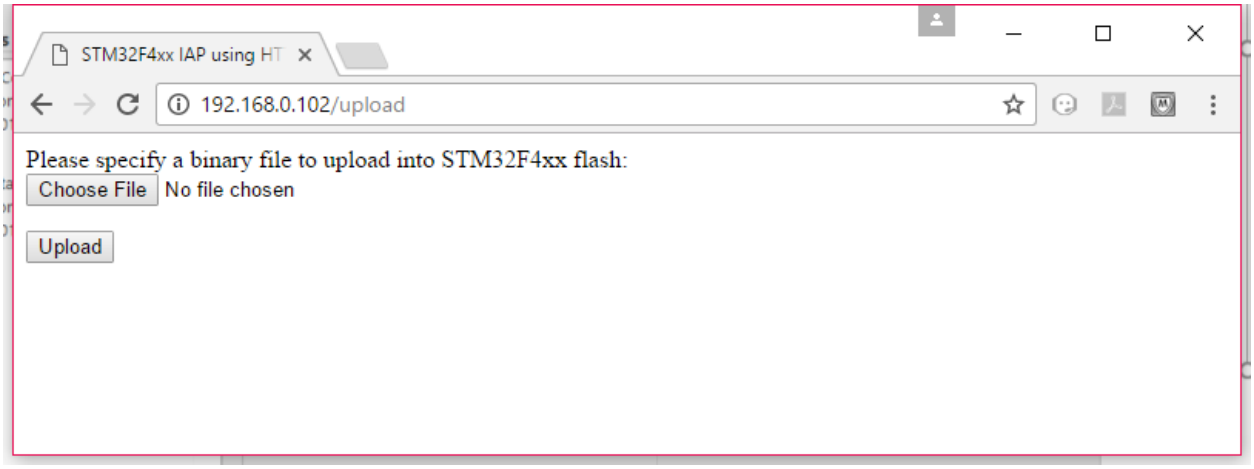
8 Update

The pingStation supports software upgrades thru a web-based flashing system. The user will launch the update webpage, select a firmware binary file and press a button to start the update process.

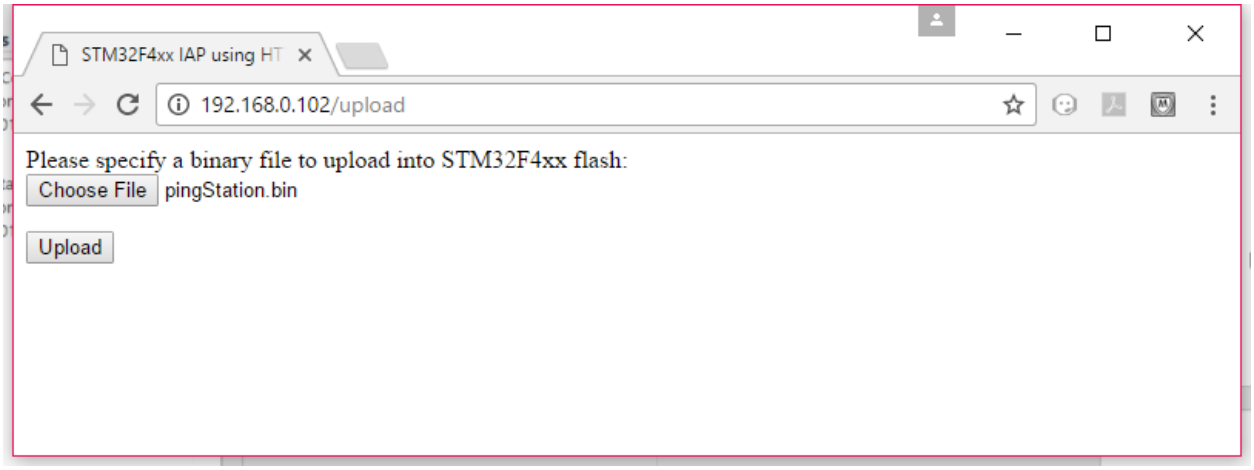
8.1 Update the pingStation system software

The update process is started by launching http://###.###.###.###/update

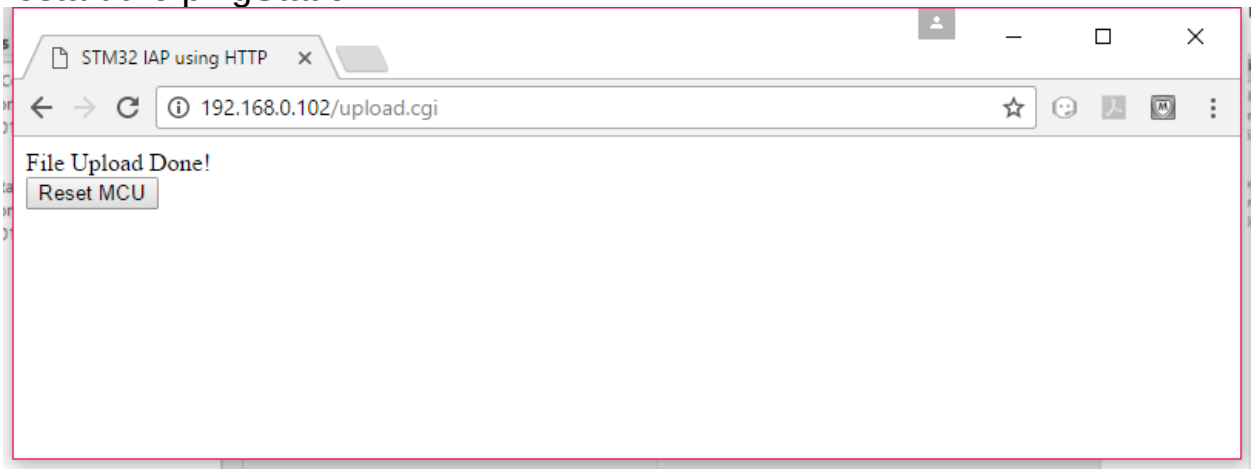
Choose the file to upload by pressing the “Choose File” button.



Press to start the upgrade process. There will be an update % status at the bottom of the page.



When the upgrade is complete you need to press the Reset MCU button to restart the pingStation.



8.2 Update ADS-B receiver software

Version 1.1.5 and later of the pingStation system software supports in field updating of the ADS-B receiver software.

From the pingStation configuration page http://###.###.###.###/ select the “Update” link in line with the ADS-B Version report, or access the updater directly at http://###.###.###.###/pingUpdate

Latitude: 48.091732 Longitude: -114.105011
Receiver BPS: 921600 GPS BPS: 115200
Version: 1.1.5
ADS-B Version: 2.4.36 Update

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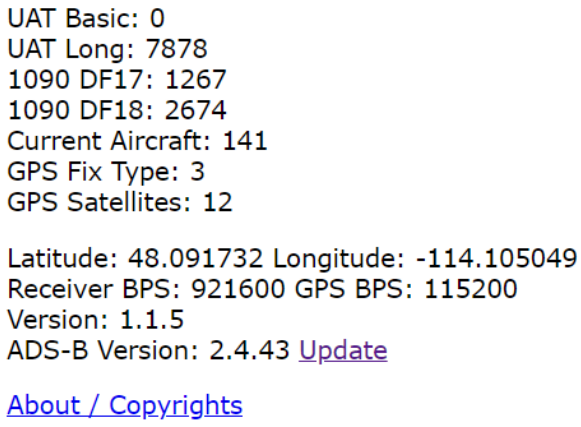
From the pingUpdate page select “Choose File” and select the latest receiver software. V2.4.43 is shown as an example.

Select “Start Update”

The progress bar will cycle during the update. At completion the updater will report the status of the update. The status will report “Update Complete” if successful.

Return to the pingStation configuration page http://###.###.###.###/ and verify the receiver version matches the version uploaded.



9 Virtual Radar Server Receiver

This is an example of creating a Virtual Radar Server receiver that will render the Compressed VRS data from the pingStation.

9.1 Configure pingStation

Open the pingStation setup screen by visiting the pingStation IP address using a web browser.

Enable the TCP Compressed VR output
Enter an IP Address or hostname i.e.192.168.0.200 or vrs.uavionix.com
Enter the TCP port i.e. 30003
Click Update

Configuration

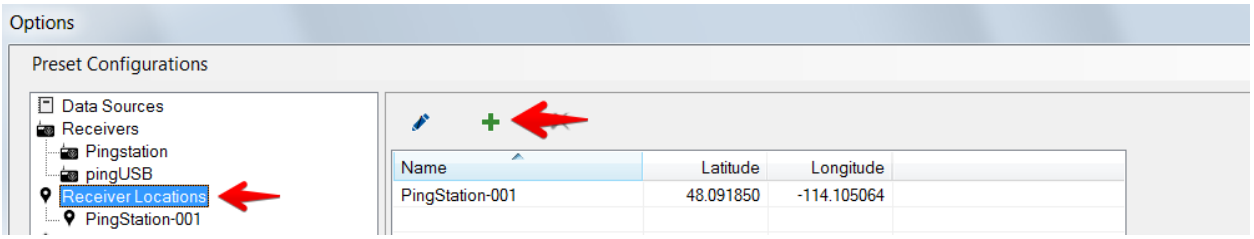
Output Formats:	☐ UDP JSON ☑ TCP Compressed VR
UDP Target IP Address or Hostname:	192.168.2.5
UDP Target Port:	30000
TCP Push IP Address or Hostname:	vrs.uavionix.com
TCP Port:	30008
Altitude Ceiling In Feet:	0 (0 = No Filter)
Max Radius In Miles:	0 (0 = No Filter)
Station Info Interval In Seconds:	30
Static IP Address:	192.168.2.200 (0.0.0.0 for DHCP)
Subnet Mask:	255.255.255.0
Gateway IP Address:	192.168.2.1
DNS Address:	8.8.8.8

Update

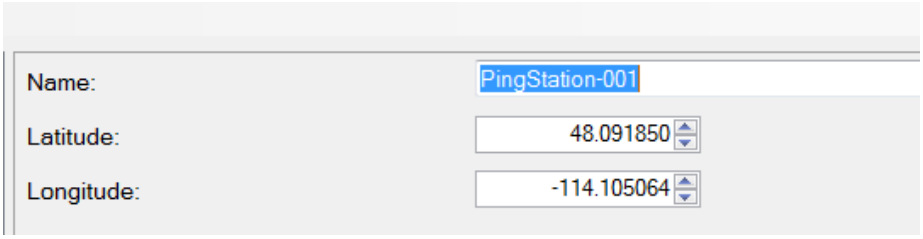
9.2 Configure Virtual Radar Server

Download and install Virtual Radar Server from:
http://www.virtualradarserver.co.uk/

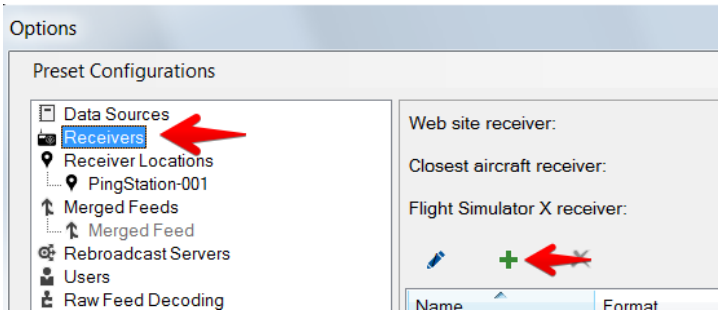
Open Virtual Radar Server
Select *Tools* > *Options*
Select *Receiver Locations*
Click the + (plus sign)



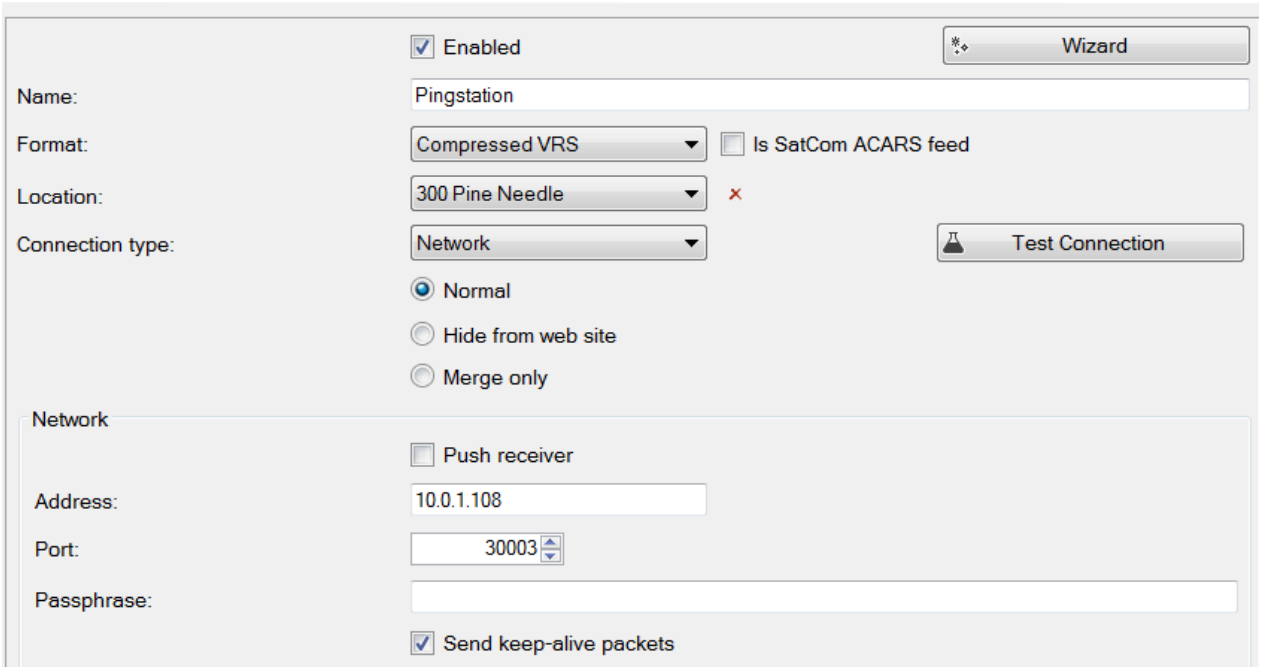
Enter a name for the receiver
Enter the latitude and longitude
Click *OK*
Note: Receiver latitude and longitude are available from the pingStation webpage



Select *Receivers* and click the + (plus sign).



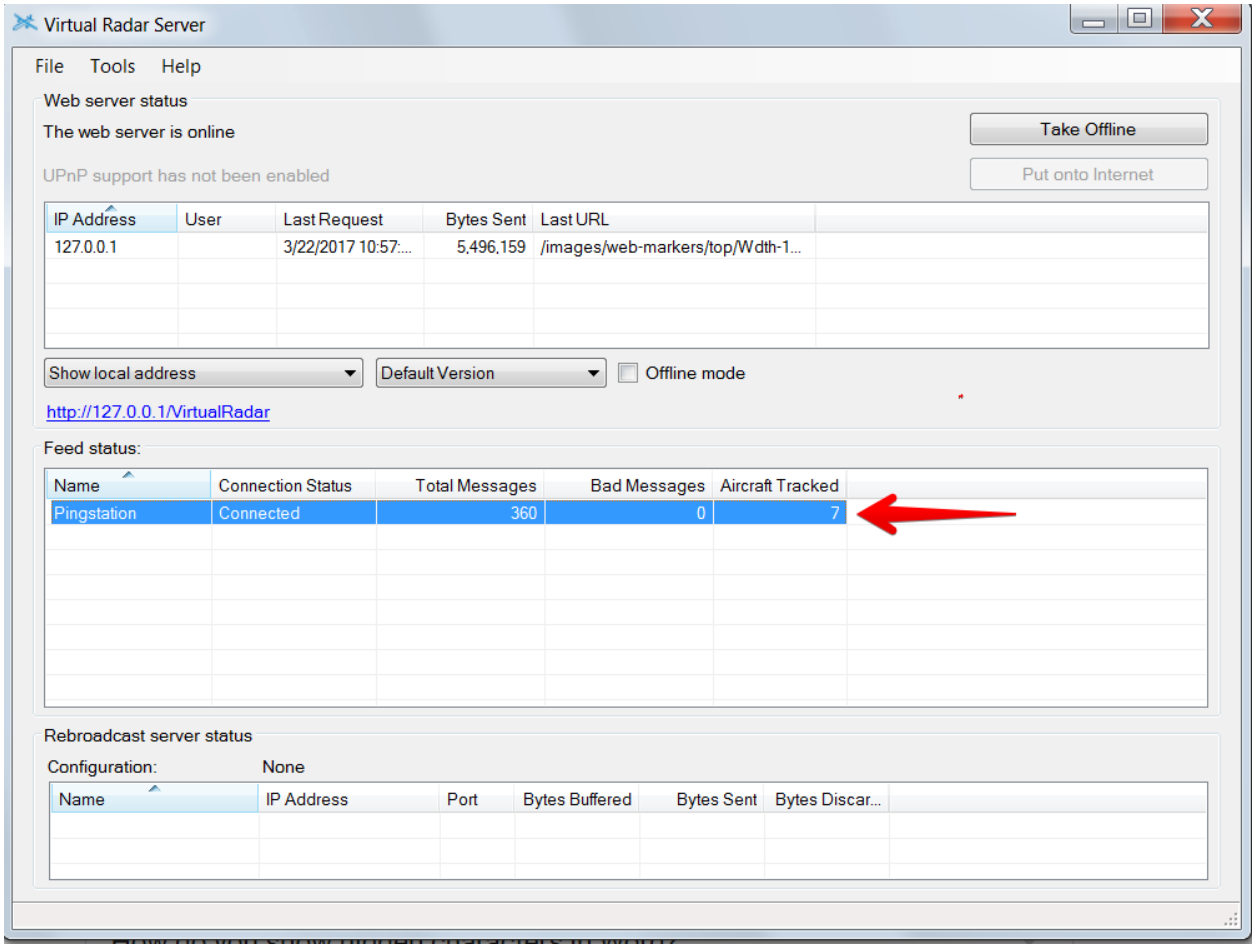
Configure a receiver as shown below:



Enable:	Select *Enabled*
Name:	Enter a name for the receiver
Format:	*Compressed VRS*
Location:	Choose the receiver location from the dropdown
Connection Type:	Network
Push Receiver:	Use to have the pingStation create the TCP connect
Or	
Address:	Enter pingStation IP address to TCP connect
Port:	Enter the same TCP port as pingStation setup
Send Keep-alive:	Select *Enabled*

Click OK

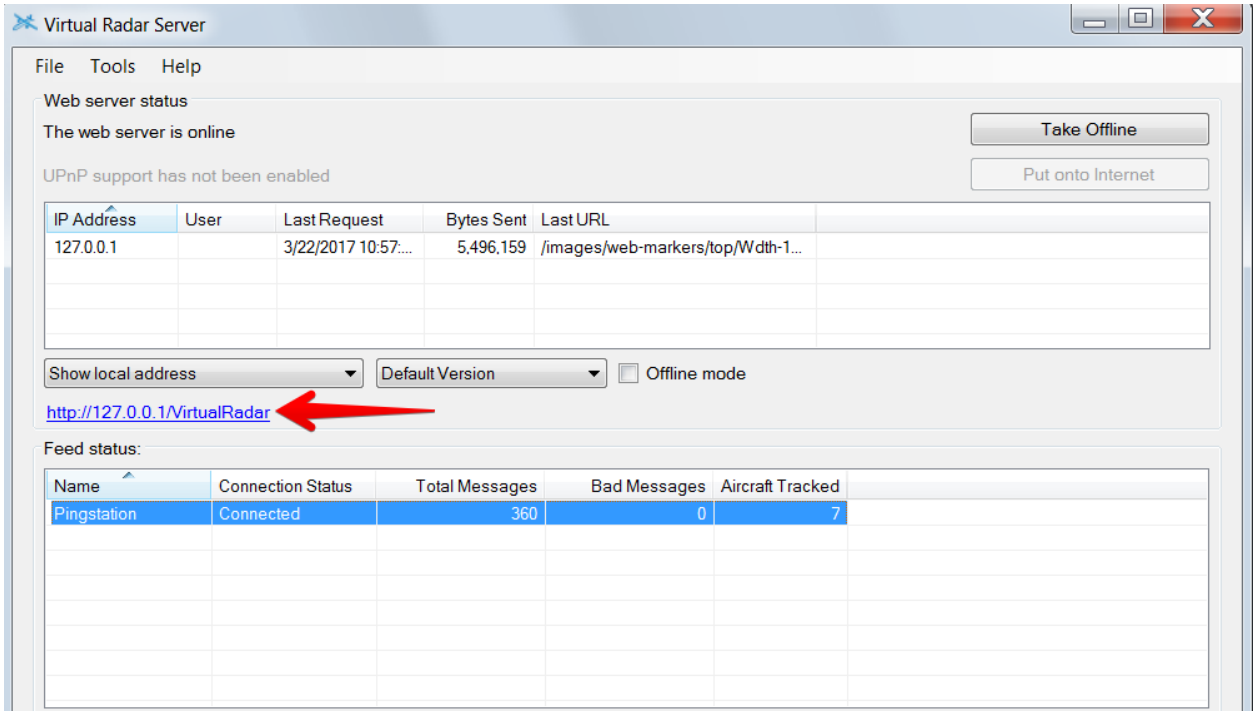
After setup verify that the Virtual Radar Server shows a *Connected* status and that the message counter is increasing. Note that you may be required to have traffic before the state will change to *Connected*.

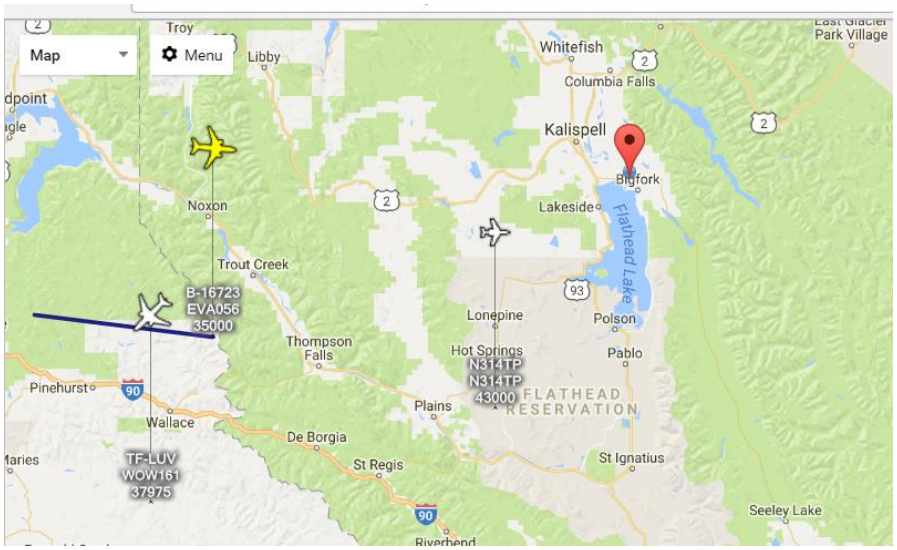


9.3 Configure Virtual Radar Moving Map Home Location

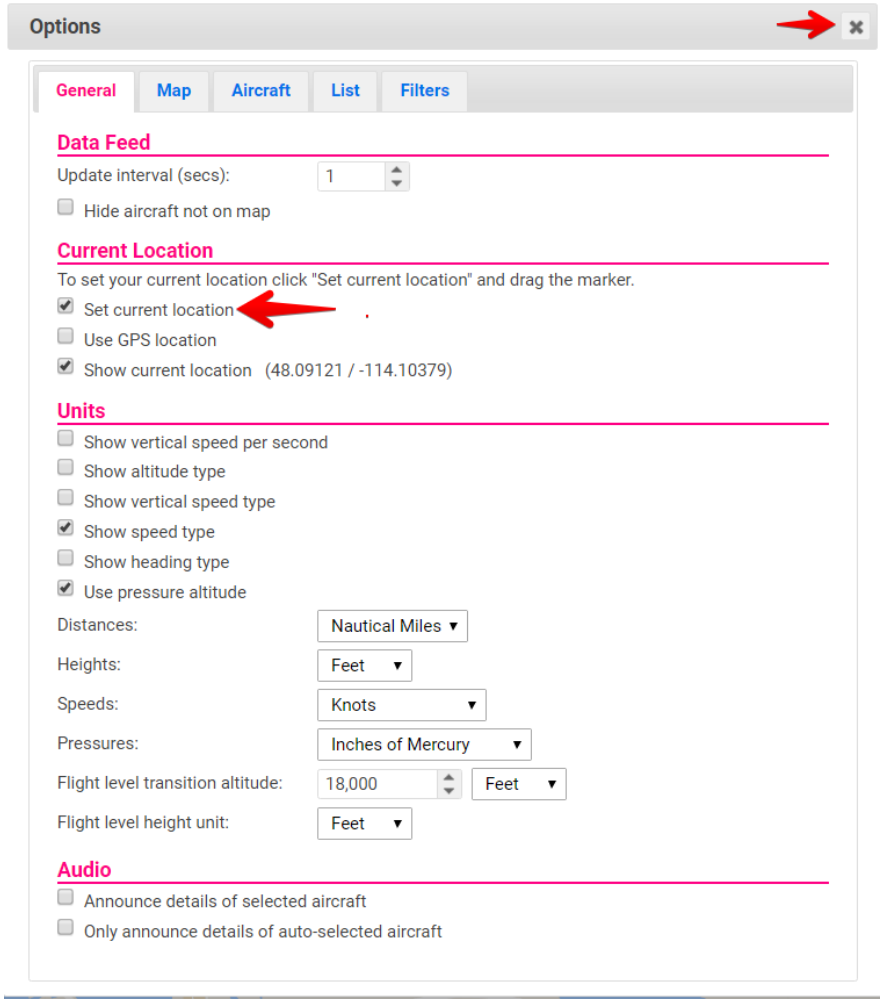
To view the aircraft on a moving map open a browser to your Virtual Radar installation. The default address is: http://127.0.0.1/VirtualRadar

A clickable hyperlink to the page is located on the Virtual Radar Server window.


Virtual Radar Server
File
Tools
Help
Web server status
The web server is online
Take Offline
UPnP support has not been enabled
Put onto Internet
IP Address
User
Last Request
Bytes Sent
Last URL
127.0.0.1
3/22/2017 10:57:...
5,496,159
/images/web-markers/top/Wdth-1...
Show local address
Default Version
Offline mode
http://127.0.0.1/VirtualRadar
Feed status:
Name
Connection Status
Total Messages
Bad Messages
Aircraft Tracked
Pingstation
Connected
360
0
7


Map
Menu
Troy
Libby
Whitefish
Columbia Falls
Kalispell
Bigfork
Lakeside
Flathead Lake
Noxon
Trout Creek
B-16723
EVA056
35000
Thompson Falls
Lonepine
Polson
Pablo
Hot Springs
N314TP
N314TP
43000
FLATHEAD RESERVATION
Pinehurst
Wallace
Plains
De Borgia
St Regis
St Ignatius
TF-LUV
WOW161
37975
Seeley Lake
Park Village

From the Virtual Radar webpage click *Menu* > *Options*
Select the *General* tab
Select *Set Current Location*
Click the *X (close)*



Click and drag the red location icon to your location on the map.

For Virtual Radar Server documentation visit:
http://www.virtualradarserver.co.uk/

For support with pingStation visit http://uavionix.com/support/

Technical Parameters

	Parameter	Value
System		
	Bandwidth	921600bps
	Operating Temp	-40°C to 80°C
	Voltage	37 to 57V
	Power	1.5W
	Dimensions	310x120x55mm
	Weight	340grams
GPS	Sensitivity	-167dBm
	Constellations	GPS Galileo GLONASS QZSS BeiDou
1090MHz Receiver DO-260B	MSR99 MSR90	-99Bm -98dBm to 0dBm
	ADS-B reports	DF17, DF18, DF19
978MHz Receiver DO-282B	MSR99 MSR90	-83dBm -82dBm to 0dBm
	ADS-B reports	BASIC, LONG

CE

The CE Declaration of Conformity was issued for this product.
The product is marked with the CE marking.