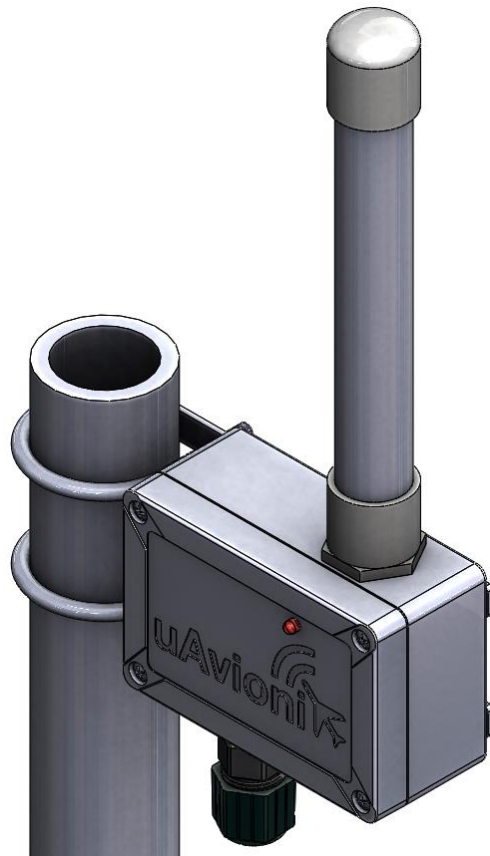




PingStation

User and Installation Guide

REVISION H



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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

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.

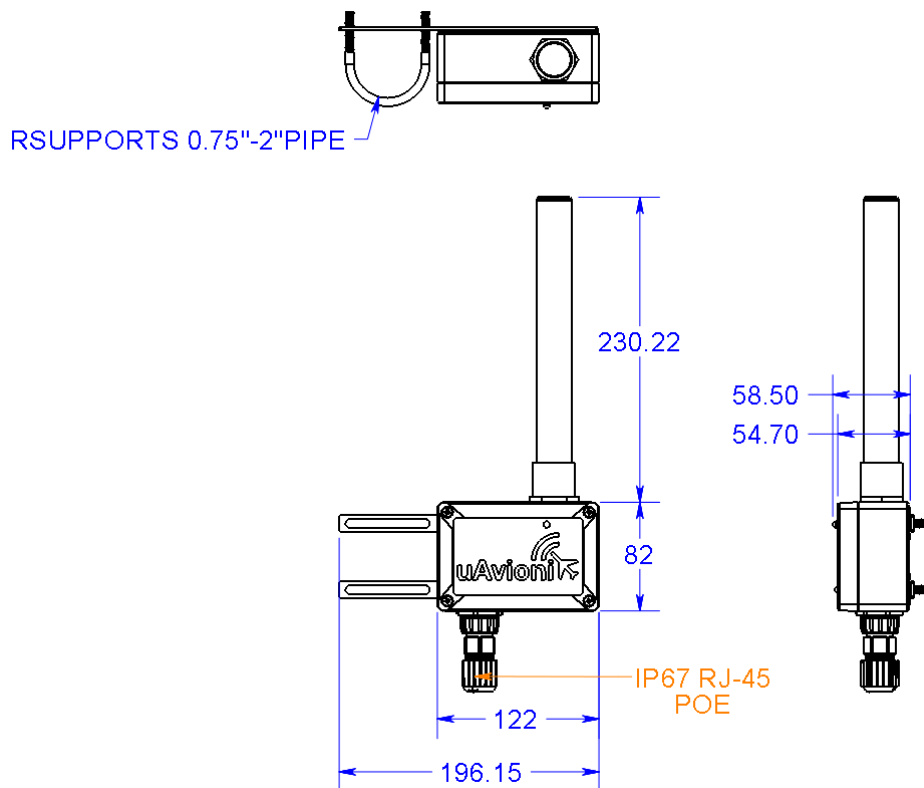
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5 Introduction

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' 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.

To mount the brackets to the PingStation, screw the four (4) self-tapping screws through the holes in the bracket into the holes in the four (4) corners of the back of the PingStation.



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

802.3af Mode B			
PINS on Switch	10/100 DC on Spares		1000 (1 Gigabit) DC & Bi-Data
	1	Rx +	TxRx A +
2	Rx -	TxRx A -	
3	Tx +	TxRx B +	
4	DC +	TxRx C +	DC +
5	DC +	TxRx C -	DC +
6	Tx -	TxRx B -	
7	DC -	TxRx D +	DC -
8	DC -	TxRx D -	DC -



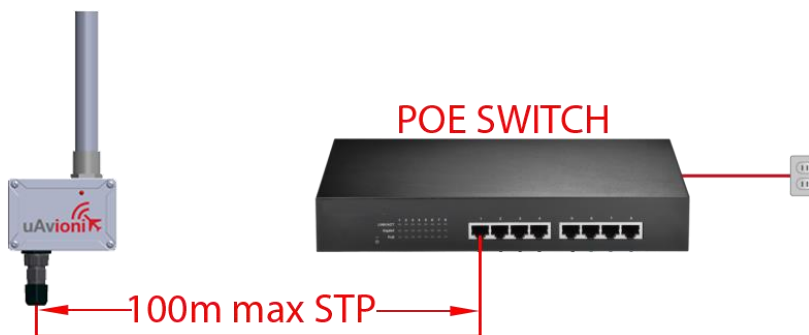
Caution!

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

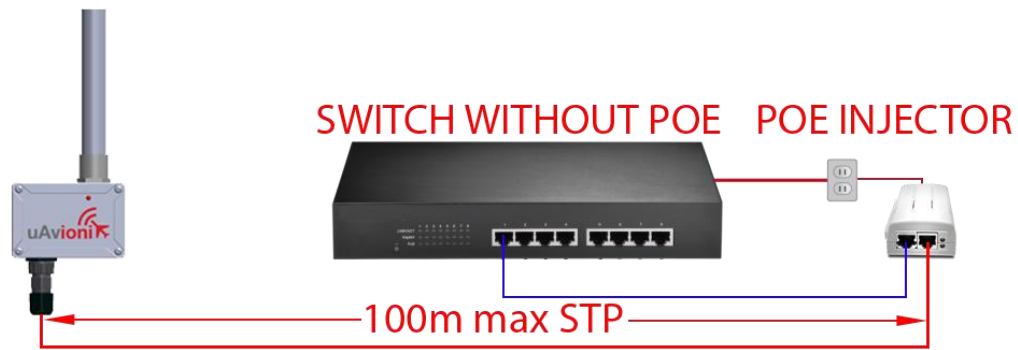
7 Configuration

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://xxx.xxx.xxx.xxx/>

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

PingStation status URL:

<http://xxx.xxx.xxx.xxx/api/v1/status>

Displays the status json sentence/

PingStation traffic URL:

<http://xxx.xxx.xxx.xxx/api/v1/traffic>

Displays the current traffic json sentences.

PingStation update URL:

<http://xxx.xxx.xxx.xxx/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:

UDP Target Port:

TCP Push IP Address or Hostname:

TCP Port:

Altitude Ceiling In Feet: (0 = No Filter)

Max Radius In Miles: (0 = No Filter)

Station Info Interval In Seconds:

Static IP Address: (0.0.0.0 for DHCP)

Subnet Mask:

Gateway IP Address:

DNS Address:

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	<p>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.</p> <p>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.</p>
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

Update

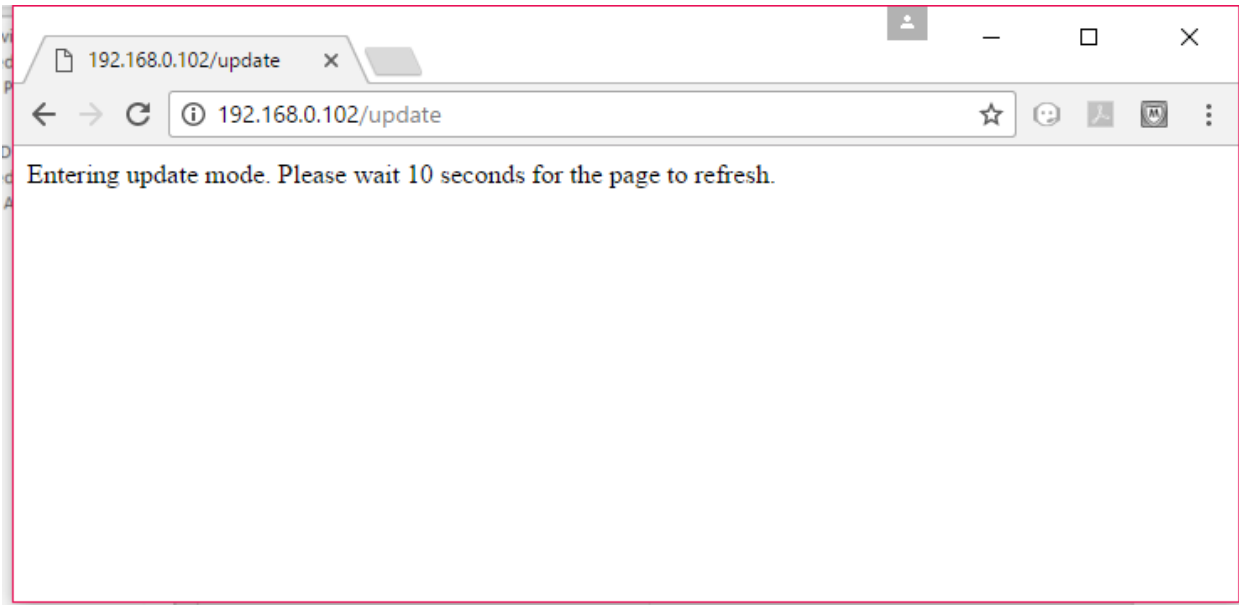
When you modify any configuration item, press the Update button to store the changes. These fields are non-volatile and persist through power cycles.

7.2.2 Health Statistics

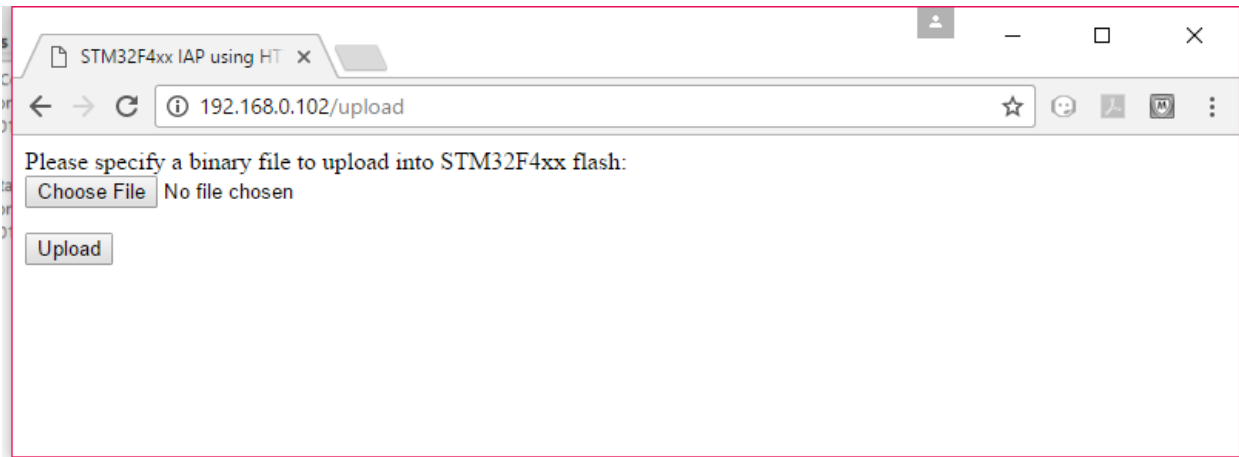
Statistic	Description
UAT Basic	The number of UAT basic aircraft messages received.
UAT Long	The number of UAT long aircraft messages received.
1090 DF17	The number of 1090 ADS-B aircraft messages received.
1090 DF18	The number of 1090 TIS-B messages received.
Current Aircraft	The number of aircraft 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 Updater

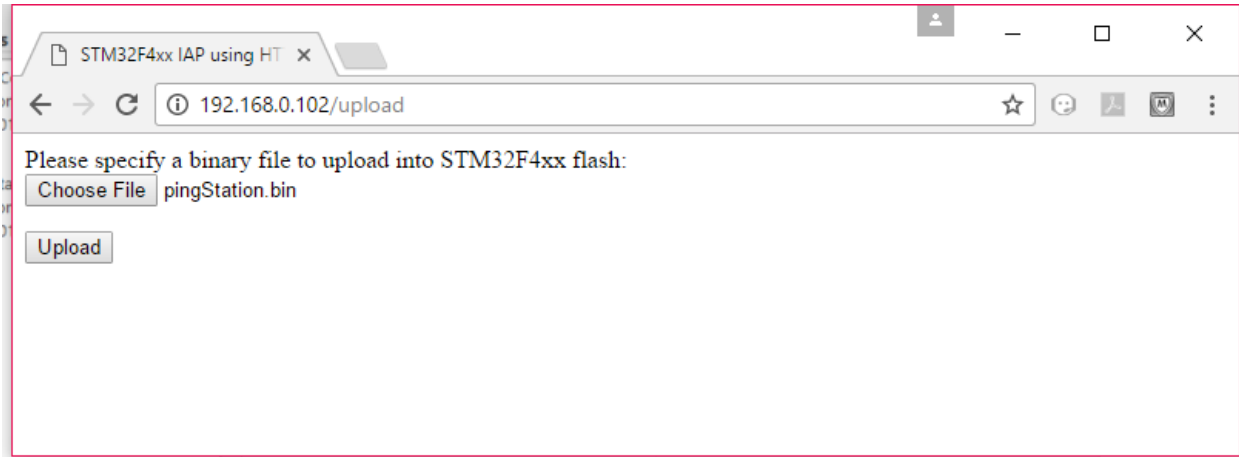
The pingStation supports software upgrades thru a web based flashing system. The user will launch the update webpage, select a firmware binary file and press a button to start the update process. The update process is started by launching <http://xxx.xxx.xxx.xxx/update>



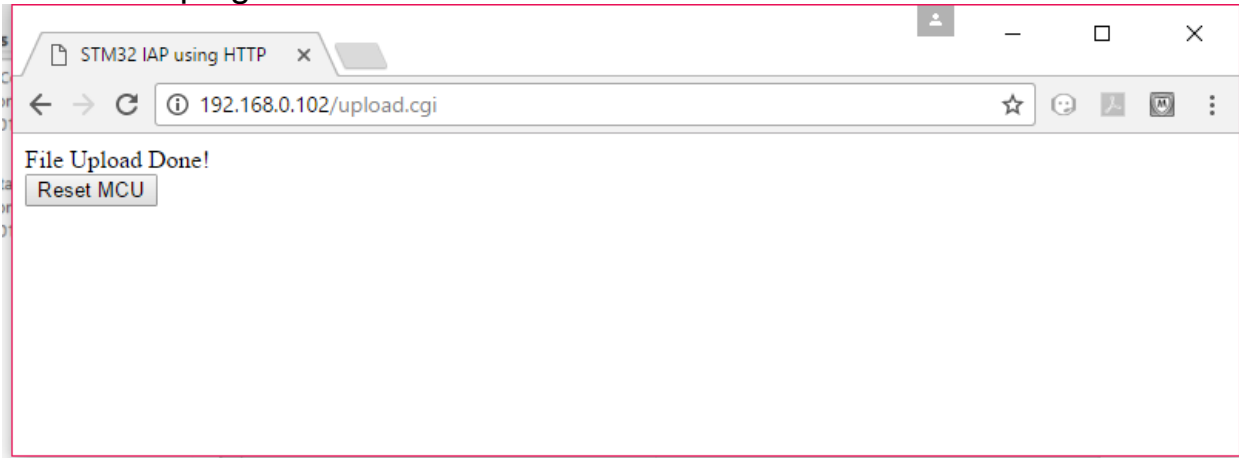
Choose the file to upload by pressing the “Choose File” button.



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.



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 the TCP port i.e. 30003

Click Update



Configuration

Output Formats: UDP JSON TCP Compressed VR

UDP Target IP Address:

UDP Target Port:

TCP Listen Port:

Altitude Ceiling In Feet: (0 = No Filter)

Max Radius In Miles: (0 = No Filter)

Four red arrows point to specific elements in the configuration form: one points to the 'TCP Compressed VR' checkbox, one points to the '30003' value in the 'TCP Listen Port' field, one points to the 'Update' button, and one points to the '30000' value in the 'UDP Target Port' field.

9.2 Configure Virtual Radar Server

Download and install Virtual Radar Server from:

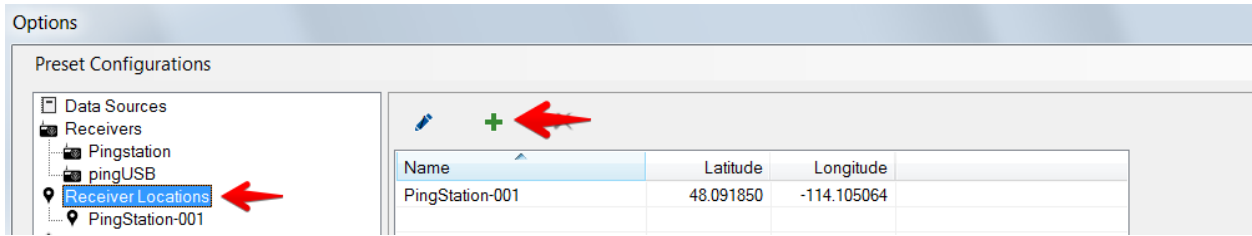
<http://www.virtualradarserver.co.uk/>

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

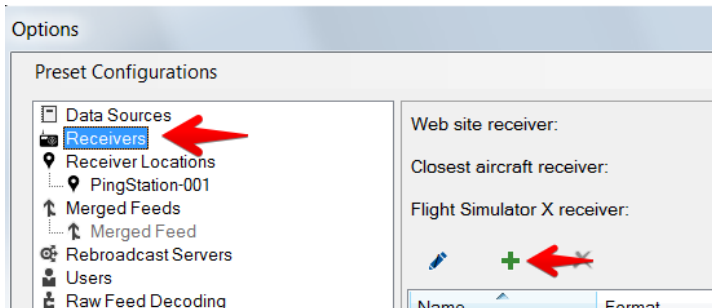
Note: Receiver latitude and longitude are available from the pingStation webpage

Name:

Latitude:

Longitude:

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



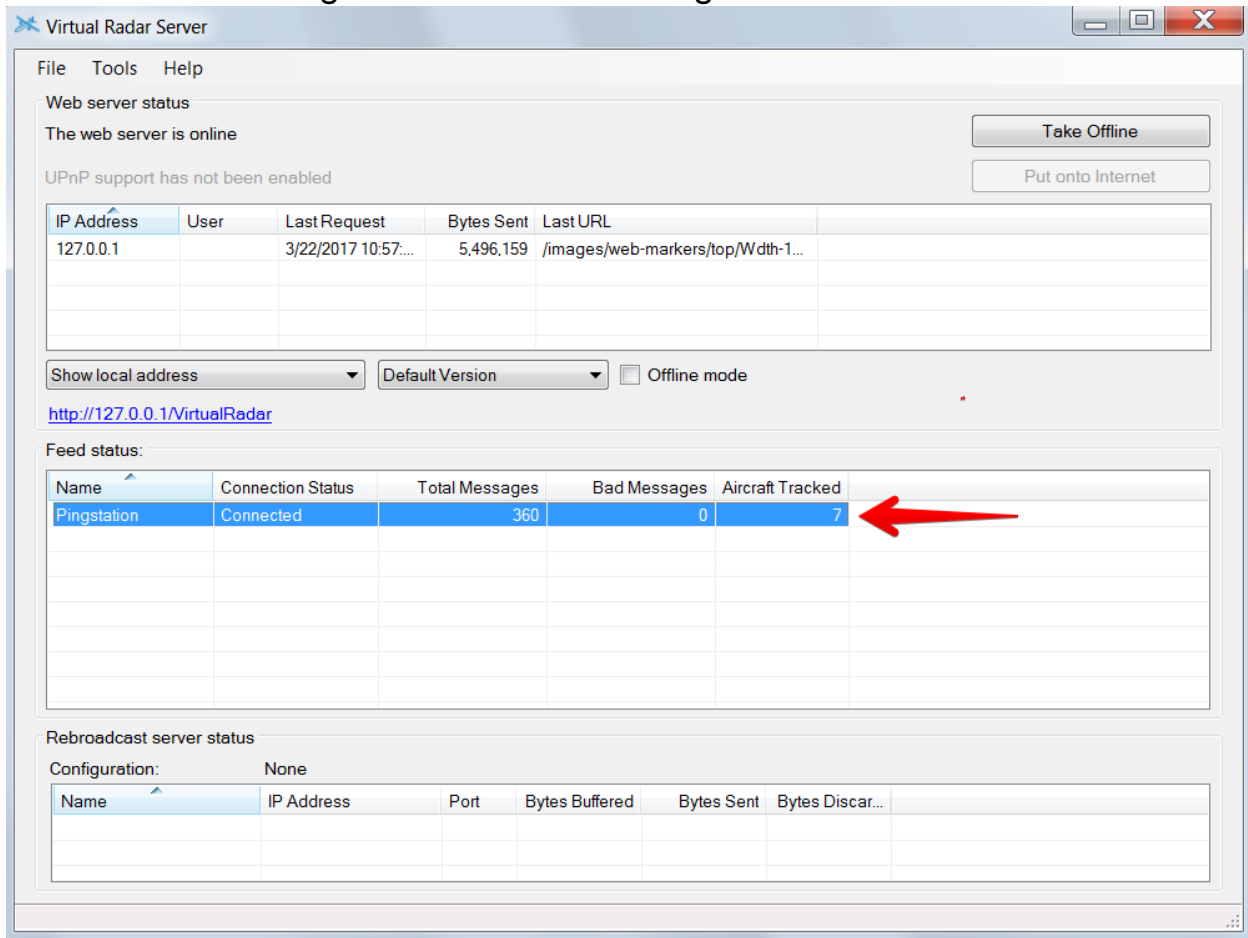
Configure a receiver as shown below:

The screenshot shows a configuration wizard for a receiver. At the top right, there is a 'Wizard' button with a star icon. The main configuration area includes: a checked 'Enabled' checkbox; a 'Name' field containing 'Pingstation'; a 'Format' dropdown menu set to 'Compressed VRS'; an unchecked 'Is SatCom ACARS feed' checkbox; a 'Location' dropdown menu set to '300 Pine Needle' with a red 'x' icon to its right; a 'Connection type' dropdown menu set to 'Network'; a 'Test Connection' button with a flask icon; three radio buttons for 'Normal' (selected), 'Hide from web site', and 'Merge only'; a 'Network' section containing an unchecked 'Push receiver' checkbox; an 'Address' field containing '10.0.1.108'; a 'Port' spinner box set to '30003'; an empty 'Passphrase' field; and a checked 'Send keep-alive packets' checkbox.

- Enable: Select *Enabled*
- Name: Enter a name for the receiver
- Format: *Compressed VRS*
- Location: Choose the receiver location from the dropdown

- Connection Type: Network
- Address: Enter pingStation IP address
- 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.



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

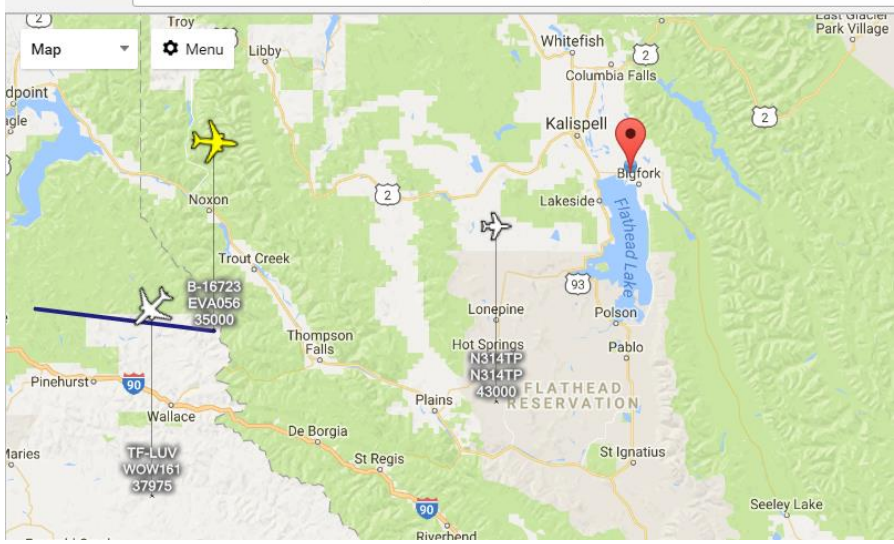
IP Address	User	Last Request	Bytes Sent	Last URL
127.0.0.1		3/22/2017 10:57:...	5,496,159	/images/web-markers/top/Wdth-1...

Show local address ▼ Default Version ▼ Offline mode

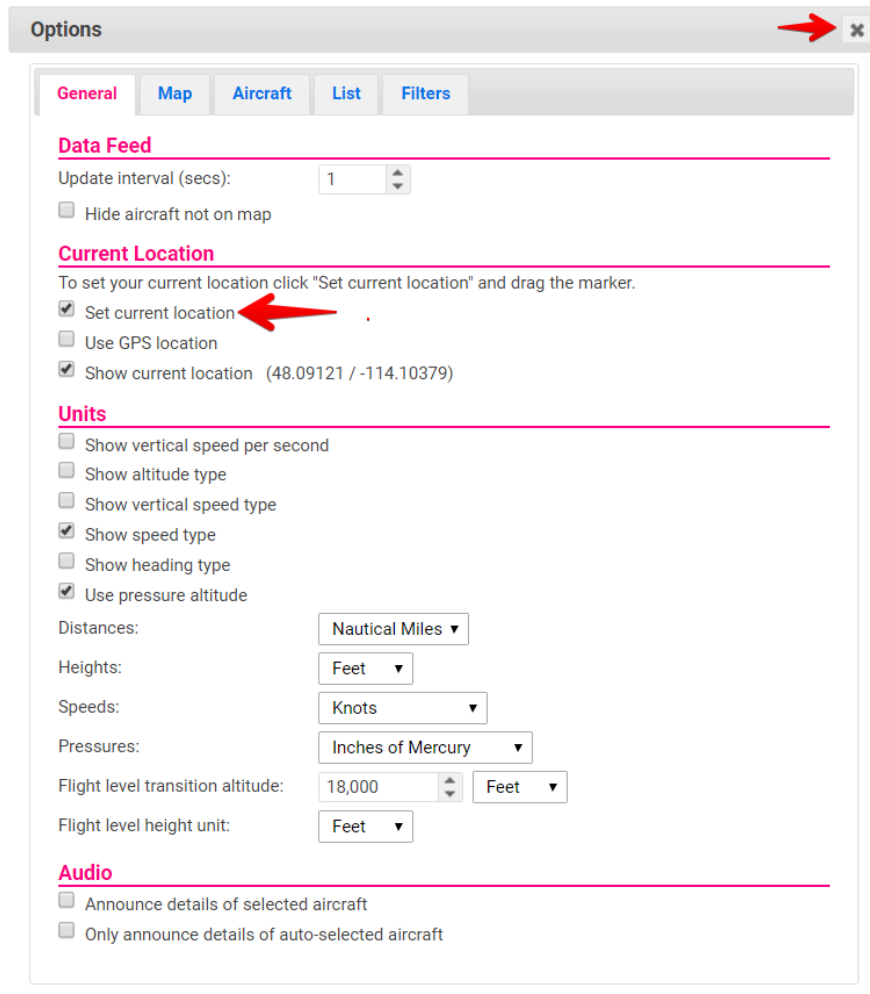
<http://127.0.0.1/VirtualRadar>

Feed status:

Name	Connection Status	Total Messages	Bad Messages	Aircraft Tracked
Pingstation	Connected	360	0	7



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



The screenshot shows the 'Options' dialog box with the 'General' tab selected. The 'Current Location' section is highlighted with a pink line, and the 'Set current location' checkbox is checked and pointed to by a red arrow. The 'Close' button in the top right corner is also pointed to by a red arrow. The 'Data Feed' section has 'Update interval (secs):' set to 1 and 'Hide aircraft not on map' unchecked. The 'Units' section has 'Show speed type' checked, and 'Distances' set to 'Nautical Miles'. The 'Audio' section has 'Announce details of selected aircraft' and 'Only announce details of auto-selected aircraft' both unchecked.

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
	Constellations	GPS Galileo GLONASS QZSS BeiDou
1090MHz Receiver DO-260B	MSR99	-99dBm
	MSR90	-98dBm to 0dBm
	ADS-B reports	DF17, DF18, DF19
978MHz Receiver DO-282B	MSR99	-83dBm
	MSR90	-82dBm to 0dBm
	ADS-B reports	BASIC, LONG



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