

PingStation User and Installation Guide

REVISION K



UAV-1001358-001

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1 Revision History

Revision	Date	Comments
А	1/21/17	Initial release
В	2/13/17	Updated PB
С	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
Н	6/8/18	NV parms update and new webpage layout
J	1/8/19	Added ADS-B receiver update process
К	11/11/19	Modify screenshots and instructions VRS setup



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 $\frac{3}{4}$ " 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	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



802.3af Mode B							
PINS on Switch 10/100 DC on Spares 1000 (1 Gigabil) DC & Bi-Data							
12345678	1	Rx +	TxRx A +				
	2	Rx -	TxRx A				
	3	Tx +	TxRx B +				
	4	DC +	TxRx C +	DC +			
(Labola)	5	DC +	TxRx C -	DC +			
	6	6 Tx - TxRx		В-			
	7	DC -	TxRx D +	DC -			
T568B Color	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://###.###.###/

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
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.

8.1 Update the pingStation system software

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



▲ 192.168.0.102/update ×	_		×
← → C ① 192.168.0.102/update	☆	0 1	
Entering update mode. Please wait 10 seconds for the page to refresh.			

Choose the file to upload by pressing the "Choose File" button.

 ← → C ① 192.168.0.102/upload ★ ② M ⑧ E Please specify a binary file to upload into STM32F4xx flash: Choose File No file chosen Upload 	5	🕒 STM32F4	xx IAP using H⊤ ×	±	_			>	<
Please specify a binary file to upload into STM32F4xx flash: Choose File No file chosen Upload		$\leftrightarrow \ \exists \ G$	③ 192.168.0.102/upload		☆	•	J.	At.	:
	ta pr	Please specif Choose File Upload	y a binary file to upload into STM32F4xx flash: No file chosen						

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

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STM32F4xx IAP using HT ×	1	_		×
$\leftrightarrow \rightarrow \mathbb{C}$ (1) 192.168.0.102/upload		☆ 😳	<i>J.</i>	. ⊡
Please specify a binary file to upload into STM32F4xx flash: Choose File pingStation.bin Upload				

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 inline 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 <u>Update</u>
```

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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.

Ping Update

Choose File	PingTransceiv2.4.43.uav	Start Update
Advanced		

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.

Ping Update

Update complete.

Choose File	PingTransceiv2.4.43.uav	Start Update

Advanced

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

UAT Basic: 0 UAT Long: 7878 1090 DF17: 1267 1090 DF18: 2674 Current Aircraft: 141 GPS Fix Type: 3 GPS Satellites: 12 Latitude: 48.091732 Longitude: -114.105049 Receiver BPS: 921600 GPS BPS: 115200 Version: 1.1.5 ADS-B Version: 2.4.43 <u>Update</u>

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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 JS	SON 🗹 TCP (Compressed VR
UDP Target IP Address or Hostname:	192.168.2	2.5	
UDP Target Port:	30000		
TCP Push IP Address or Hostname:	vrs.uavior	nix.com 🗡	
TCP Port:	30008 🚽		
Altitude Ceiling In Feet:	0	(0 = No Filte	r)
Max Radius In Miles:	0	(0 = No Filte	r)
Station Info Interval In Seconds:	30		
Static IP Address:	192.168.2	2.200	(0.0.0.0 for DHCP)
Subnet Mask:	255.255.2	255.0	
Gateway IP Address:	192.168.2	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*

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

Name:	PingStation-001
Latitude:	48.091850
Longitude:	-114.105064

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



Configure a receiver as shown below:

	Enabled	**	Wizard
Name:	Pingstation		
Format:	Compressed VRS Is SatCom ACARS	feed	
Location:	300 Pine Needle 🔹 🗙		
Connection type:	Network	–	Test Connection
	Normal		
	─ Hide from web site		
	C Merge only		
Network			
	Push receiver		
Address:	10.0.1.108		
Port:	30003 💭		
Passphrase:			
	Send keep-alive packets		

Enable: Name: Format: Select *Enabled* Enter a name for the receiver *Compressed VRS*



Location:	Choose the receiver location from the dropdown
Connection Type: Push Receiver: Or	Network Use to have the pingStation create the TCP connect
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*.

	neip								
leb server sta	atus								
he web serve	r is online							Tal	ke Offline
PnP support	has not been	enabled						Put o	nto Internet
P Address	User	Last Reque	st	Bytes Sent	Last URL				
127.0.0.1		3/22/2017 10	0:57:	5,496,159	/images/web-markers/	top/Wdth-1			
bow local ad	trace	•	Defaul	It Version	Offline n	ebor			
			Delau	it version		loue			
$\frac{10}{127.0.0}$									
	1/ virtualitaua	<u>nr</u>							
eed status:		<u>ir</u>							
eed status: Name	Conn	ar ection Status	Т	otal Message	s Bad Messages	Aircraft Trad	cked		
eed status: Name Pingstation	Conn	ection Status ected	T	otal Message 36	s Bad Messages 0 0	Aircraft Trac	cked		
eed status: Name Pingstation	Conn	ection Status	T	otal Message: 36	s Bad Messages 0 0	Aircraft Trac	cked		
eed status: Name Pingstation	Conn	ection Status ected	T	otal Message 36	s Bad Messages 0 0	Aircraft Trad	cked		
eed status: Name Pingstation	Conn	ection Status ected	T	otal Message 36	s Bad Messages 0 0	Aircraft Trad	cked		
eed status: Name	Conn	ection Status	T	otal Message 36	s Bad Messages 0 0	Aircraft Trac	cked 7		
eed status: Name	Conn	ection Status ected	T	otal Message: 36	s Bad Messages 0 0	Aircraft Trac	cked		
eed status: Name Pingstation	Conn	ection Status ected	T	otal Message: 36	s Bad Messages 0 0	Aircraft Trad	7		
eed status: Name Pingstation ebroadcast s	Conn Conn erver status	ection Status ected	T	otal Message: 36	s Bad Messages 0 0	Aircraft Trad	2ked 7		
eed status: Name Pingstation ebroadcast s Configuration:	Conn Conn erver status	ection Status ected	T	otal Message: 36	s Bad Messages 0 0	Aircraft Trad	2ked 7		
eed status: Name Pingstation ebroadcast s configuration: Name	Conn Conn erver status	ection Status ected None IP Address	T	otal Message: 36 Port E	s Bad Messages 0 0 0	Aircraft Trad	s Discar		
eed status: Name Pingstation ebroadcast s Configuration: Name	Conn Conn erver status	ection Status ected None IP Address	T	otal Message: 36 Port E	s Bad Messages 0 0 0 3ytes Buffered Byte	Aircraft Trad	cked 7		



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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: <u>http://127.0.0.1/VirtualRadar</u>

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

Virtual Radar S	erver						_ 🗆 🗙
ile Tools	Help						
Web server sta	tus						
The web server	is online					Take	Offline
UPnP support ł	nas not beer	n enabled				Put onto	o 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/t	op/Wdth-1		
Show local add	ress	Den	auit version		lode		
http://127.0.0.1	NirtualRad	ar					
Feed status:							
Name	Conr	nection Status	Total Messages	Bad Messages	Aircraft Tracked		
Pingstation	Conr	nected	360	0	7		
1							







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

General Map Aircraft	List Filters
Data Feed	
Update interval (secs):	1
Hide aircraft not on map	
Current Location	
To set your current location click	"Set current location" and drag the marker.
Set current location	
Use GPS location	
Show current location (48.0	9121 / -114.10379)
Units	
Show vertical speed per second Show vertical speed per second	ond
Show altitude type	
Show vertical speed type	
Show speed type	
Show heading type	
Use pressure altitude	
Distances:	Nautical Miles V
Heights:	Feet 🔻
Speeds:	Knots 🔻
Pressures:	Inches of Mercury
Flight level transition altitude:	18,000 🗘 Feet 🔻
Flight level height unit:	Feet v
Audio	
Huulo	

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





For Virtual Radar Server documentation visit: <u>http://www.virtualradarserver.co.uk/</u> For support with pingStation visit <u>http://uavionix.com/support/</u>





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	MSR99	-99Bm
DO-260B	MSR90	-98dBm to 0dBm
	ADS-B reports	DF17, DF18, DF19
978MHz Receiver	MSR99	-83dBm
DO-282B	MSR90	-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.

