

RealADSB

for macOS

20-JAN-2024

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1. Introduction

RealADSB app was initially created in 2013 as a research project to visualize an ADS-B air traffic provided by adsb_hub server application. Until recently the app was only implemented for iPhone and iPad. However in 2020 it was ported to macOS and finally, in 2021, app has reached Apple Watch.

Functionality of the app for iPad/iPhone and macOS is very similar:

- * Visualization of air traffic in close vicinity received from adsb_hub/adsb_hub3, **airplanes.live** API or any other source of traffic in SBS-1 format (port 30003) like dump1090 or readsb
- * List of airplanes, helicopters and ground vehicles nearby
- * Map with aircrafts
- * Access to 3rd party websites to get additional information about particular aircraft or flight
- * Multiple options to customize your experience

Largest difference is lack of access to public feeds in macOS version. It was done to protect owners of the feeds from overload.

2. Prerequisites

Hardware

In order to get an ADS-B traffic you will need 1090MHz antenna, USB dongle and computer (PC, Mac, Raspberry Pi) to run **adsb_hub3** server application. While it is possible to use cheap NooElec R820T adapters typically sold with antenna, more professional FlightAware or RadarBox hardware is highly recommended. Additional details about this subject you can find at www.realadsb.com

adsb_hub3 and **RealADSB** app can run on the same Mac computer. Otherwise you may need Wi-Fi router or Ethernet cable to connect to **adsb_hub3** from **RealADSB** app running on Mac.

Software

In most cases the **RealADSB** app requires **adsb_hub3** server application running on Windows, macOS, Raspberry Pi, etc. Since **adsb_hub3** is working on top of Java 11 or newer runtime pretty much all major computer platforms are supported. Older **adsb_hub** can be used as well but it's based on Java 8 and at this point considered obsolete.

It is possible to configure **adsb_hub3** in many different ways. Simplest use case involves **rtl_tcp** input and **bonjour** output with default port 4567. More complicated approach is to run **adsb_hub3** side by side with FR24, FlightAware or ADS-B Exchange feeder. Once again details of configuration for variety of setups can be found at www.realadsb.com

With degraded functionality **RealADSB** app is able to utilize a traffic feed in SBS-1 BaseStation format on port 30003. Such feed can be obtained from Stratux ADS-B receiver or ADS-B Exchange feeder. In this case **adsb_hub3** is not necessary but aircrafts may not have complete tracks.

Last but not least, starting with version 2.12 **RealADSB** app can utilize an airplane traffic provided by **airplanes.live** API. Please consider feeding them with your data <https://airplanes.live/get-started>

3. First run

After hardware ready and server software has been installed start **RealADSB** app on your Mac. You will be greeted with **New Connection** window inviting you to enter IP:port of the server running **adsb_hub3**. Default port number is 4567 but it can be easily changed in **adsb_hub3** JSON configuration file. Alternatively you can enter IP:30003 for traffic feed in BaseStation format. If **adsb_hub3** is running on the same Mac as **RealADSB** app then you can use 127.0.0.1:port

If **adsb_hub3** configuration file contains **adsb_exchange** or **opensky** input you can also specify ICAO code of the airport you're interested in. In any case before using it you will need to obtain access key from <https://www.adsbexchange.com/data/> or <https://openskynetwork.github.io/opensky-api/rest.html> and then follow instructions on <https://realadsb.com/exchange.html> or <https://realadsb.com/opensky.html> pages.

airplanes.live tab in the same window allows to specify ICAO code of airport and connect to **airplanes.live** API directly from Mac. There is an option to do ICAO code lookup by clicking line below text field and then search by name of the airport, city or even country.

ICAO lookup

syd

- CYQY (2864mi) Sydney, Canada
- YSBK (10342mi) Sydney, Australia
- YSSY (10350mi) Sydney, Australia

New Connection Add

IP/Port airplanes.live

IP address of adsb_hub/adsb_hub3...

IP (ex 192.168.1.14)

Port with traffic feed, 30003 for dump1090,...

Port (ex 4571)

ICAO code of the reference airport It can only be used with adsb_hub3+

ICAO (ex KJFK)

ICAO code lookup >

New Connection Add

IP/Port airplanes.live

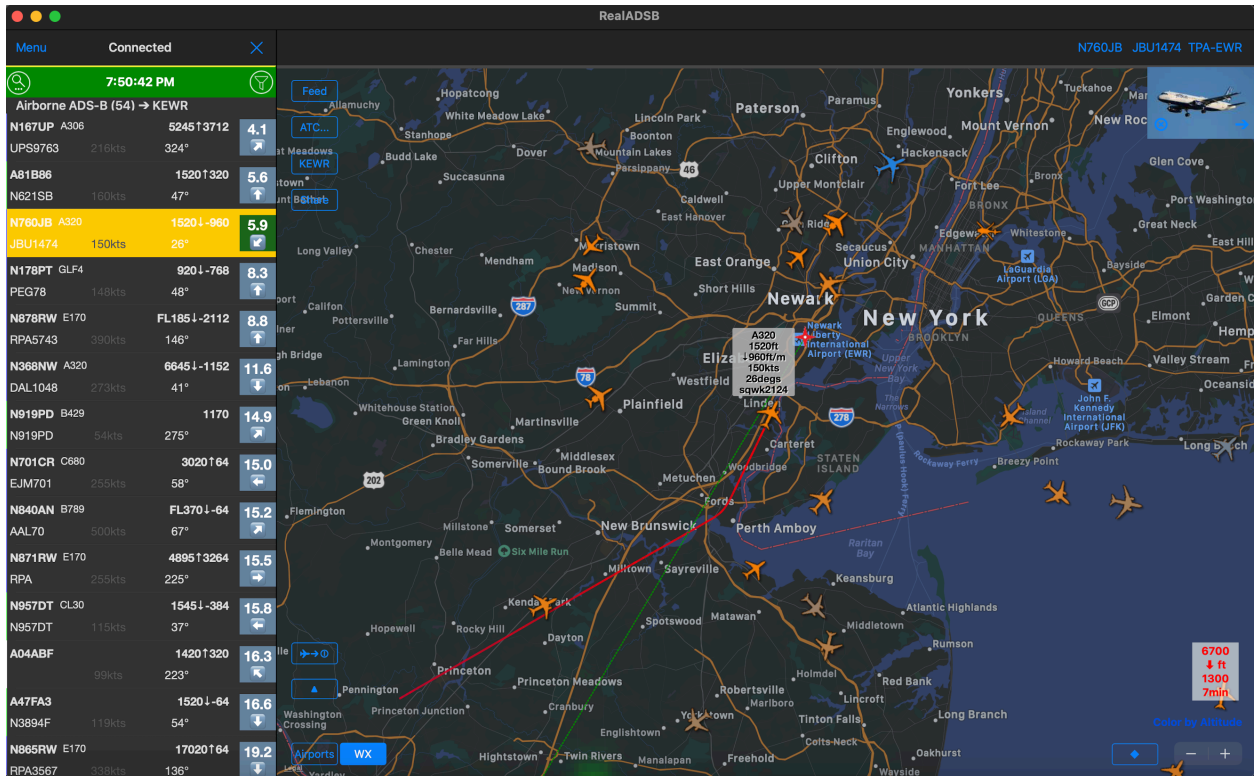
ICAO code of the reference airport

ICAO (ex KJFK)

ICAO code lookup >

Help to improve coverage ▶▶▶

Finally press Add button in the top right corner and if IP:port combination was correct you should start seeing list of aircrafts populated on the left side of main window.



Now it's perfect time to open Main Menu by clicking "Menu" in the left top corner.

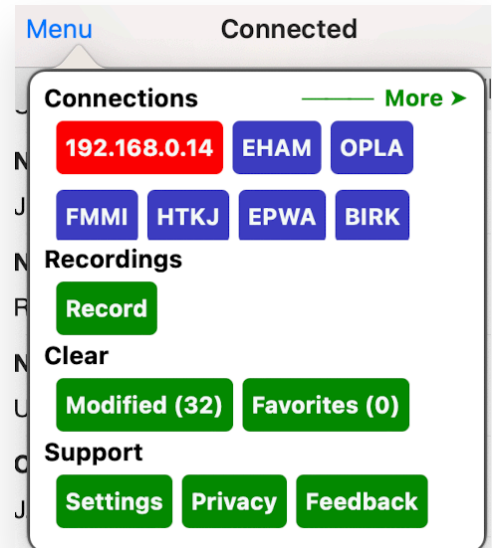
4. Main Menu

Main Menu consists of the following sections:

Connections

List of recent connections: either IP or IP:port or ICAO code of the airport. Red background indicates currently active connection, blue background is for **airplanes.live** API connections and green one is for other types of connections: **abds_hub3**, dump1090 and so on.

Click on “More >” link will open new window with list of existing connections and extra option “Bonjour” which trying to find **adsb_hub3** in your subnet and connect to it. Here you can create new connection by entering “IP:port” or delete existing one by swiping two fingers on touchpad to the left and clicking red “Delete” button.



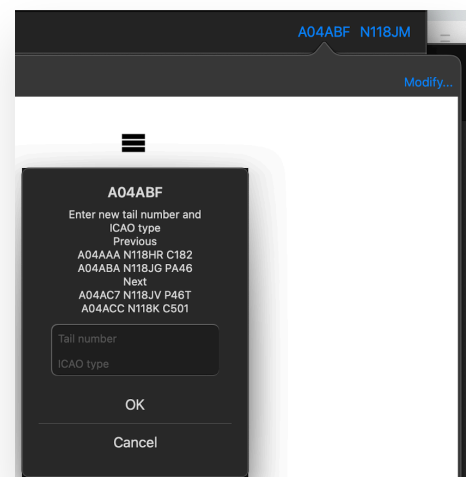
Recordings

You can record traffic feed and replay it inside the app later on with up to x5 speed. Press “Record” button to start and “X” next to “Menu” text to stop.

Modifications

RealADSB contains a database of more than 35000 airplanes, helicopters and ground vehicles. However if information for selected aircraft is missing or incorrect you can always specify tail number and ICAO designator yourself. In order to do that click on 24-bit ICAO code or tail number in the right top corner of main window and then use “Modify...” button. Such piece of information is called Local Modification and saved into your iCloud account. Entered tail number and ICAO designator will be used later on in list of aircrafts and on map. On top of that it will be automatically replicated across multiple iOS devices using same account.

“Clear” button in Main Menu allows you to delete all Local Modifications.



Support

“Settings” button allows you to customize app experience.

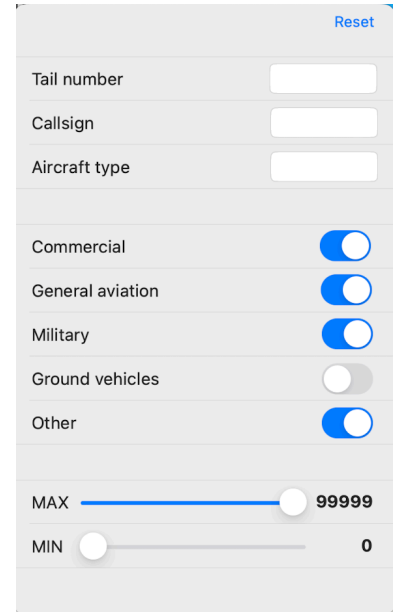
“Privacy” button opens browser window with privacy policy for the app.

“Feedback” button is giving you an option to leave an email message for **RealADSB** support.

5. List of Aircrafts

Left side of main window contains:

- * "Menu" button to open Main Menu
- * Title indicating current status of connection to the traffic feed
- * Button to connect/disconnect to/from feed
- * Button with magnifying glass image opening text box for ad-hoc filtering
- * Timestamp of last traffic update
- * Button opening window (see screenshot on the right) for more advanced static filtering by: tail number, callsign, aircraft ICAO designator, aircraft type: commercial/general aviation/military/ground vehicles/other, altitude
- * List of aircrafts divided by sections: Airborne ADS-B, Airborne ModeS and No altitude /position information



Each aircraft in the list is shown with following information (left to right, top to bottom):

- * [First line] Tail number (or ICAO 24-bit code)
- * ICAO type designator
- * Altitude and vertical speed
- * Distance and direction from reference location to aircraft
- * [Second line] Callsign
- * Horizontal ground speed (red if exceeds 250 knots below 10000 feet)
- * Heading, cross sign next to it means Enhanced Surveillance (EHS) messages are available



Color of the left border is indicating aircraft type:

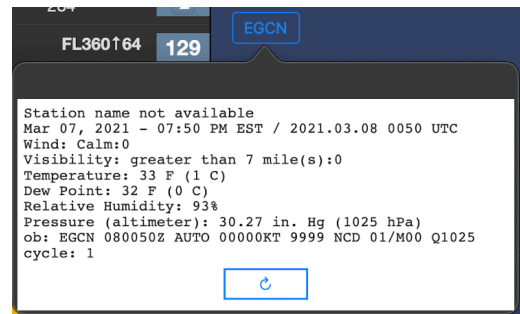
- * Red - military
- * Blue - commercial
- * Green - general aviation

6. Map of Aircrafts

Map is showing aircrafts after both ad-hoc and static filters were applied. Click on any aircraft to select it. You will see a flight track and popup window with ICAO designator, altitude, horizontal and vertical speed, heading and squawk. Also tail number, callsign and optional origin-destination IATA codes are displayed in the right top side of the main window. You can click on each of those buttons to learn more about selected aircraft or its flight on 3rd party websites: www.flightaware.com , www.radarbox.com or www.google.com . In the right top corner of map you may see picture of the aircraft with button to hide it or open it in default external browser.

Left top corner of the map contains 4 buttons:

- * Feed - opens menu containing links to access more information about traffic source, configured in **adsb_hub3** and may not be available for some sources.
- * ATC... - opens www.liveatc.net in external browser to start listening ATC audio stream (if available).
- * ABCD - ICAO code of reference airport: nearest or whatever set in Settings. When clicked opens most recent METAR for that airport in popup window.
- * Share - opens standard macOS sharing panel, image of the map with aircrafts will be shared.



Map is offering 2 extra layers toggled by buttons in the left down corner:

- * Airports - shows airports in the area, you can click on each to see ICAO/IATA code and official name. Plus in the left top corner of the map button with ICAO code of airport will appear. If you click on it new browser window with additional information will be open.
- * WX - Doppler weather radar.

Two buttons above Airports and WX are activating:

- * Local notifications about approaching aircrafts within radius specified in Settings.
- * Centering map to current user location.

And finally right bottom corner of the map contains:

- * Minimum/maximum altitude of the track for selected aircraft and how long it was observed, see Chapter 7 to know more
- * Information about color scheme for aircrafts selected in Settings
- * Selection mode: single, multiple and exclusive
- * Zoom in/out buttons

7. Vertical Profile of Track

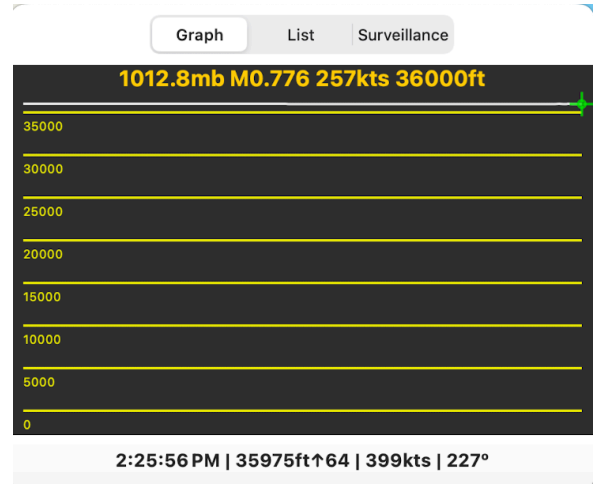
Whenever an aircraft has been selected on map the right bottom corner of screen will contain min/max altitude of its recorded track. There is also duration of the track shown below, cross sign next to it means Enhanced Surveillance (EHS) messages are available for selected aircraft. Tap on that area to open new window with Vertical Profile of Track. It contains Graph, List and Surveillance tabs visualizing following information about each point of track:

40025
↑ ft
36775
4min+

- * Timestamp
- * Altitude
- * Heading
- * Horizontal [Ground] Speed
- * Vertical Speed

On the Graph tab you can touch and drag your finger left and right to select a particular point of track. Units of measurements are controlled by Units choice in Settings.

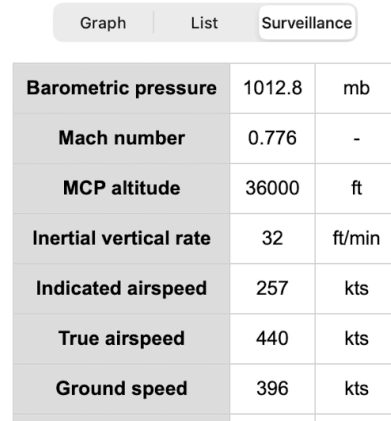
If you're using **adsb_hub3** older than version 3.7 as data source for traffic feed an aircraft heading, horizontal and vertical speeds won't be available since server application doesn't send them for each point. In order to get full data set please upgrade **adsb_hub3** to version 3.7 or newer.



#	Time	Altitude, ft	Heading	Speed, kts	VSPEED, ft/min
163	2:31:19 PM	33550	227	403	-2176
162	2:30:30 PM	35550	227	401	-1600
161	2:30:30 PM	35550	227	401	-1600
160	2:30:30 PM	35550	227	401	-1600
159	2:30:30 PM	35550	227	401	-1600
158	2:25:56 PM	35975	227	399	64
157	2:25:54 PM	35975	227	399	64
156	2:25:53 PM	35975	227	399	64
155	2:25:52 PM	36000	227	399	0

In order to observe Mode S Enhanced Surveillance (EHS) messages you need to connect to **adsb_hub3** version 3.9 or newer and use it with **rtl_tcp**, **beast_tcp** or **sbs_tcp** input. Such messages are triggered by ground based radar so your results may vary. In best case scenario you will get following information about some airplanes:

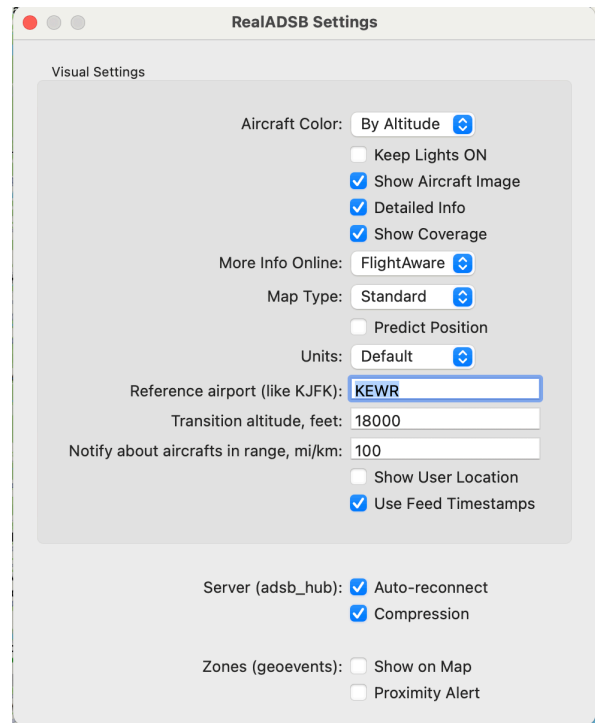
- * Barometric pressure and MCP/FMS altitudes set by pilots
- * MCP modes: VNAV, ALT HOLD, APP
- * Actual Mach number, indicated (IAS) and true (TAS) airspeeds
- * Barometric and inertial vertical speeds
- * Magnetic heading, track and roll angles
- * Timestamp of the latest message



The screenshot shows a software interface with three tabs: 'Graph', 'List', and 'Surveillance'. The 'Surveillance' tab is active and displays a table with the following data:

Barometric pressure	1012.8	mb
Mach number	0.776	-
MCP altitude	36000	ft
Inertial vertical rate	32	ft/min
Indicated airspeed	257	kts
True airspeed	440	kts
Ground speed	396	kts

8. Settings



— Visual Settings —

Aircraft Color

Defines color scheme of the aircrafts on map, there are following options:

Default	Orange by default but can be overridden by adsb_hub3 configuration. For example { "type": "sbs3_tcp", "name": "mlat", "host": "127.0.0.1", "port": 30106, "color": "#FF0000" } will make MLAT traffic red.
By ICAO24	Converts 24-bit ICAO code to color, helps to identify aircrafts from similar origin
By Altitude	Low altitude traffic is orange, high altitude is blue
By Speed	Slow traffic is red, fast traffic is green

Keep Lights ON

When selected prevents device going into a “sleep” state where the screen dims

Show Aircraft Image

When selected an aircraft image will be shown in the right top corner of the map

Detailed Info

When selected a popup of selected aircraft will contain more information

Show Coverage

When selected a polygonal shape on map will show coverage area of the radar

More Info Online

When user click on tail number above the map a browser window with 3rd party website will be open. It may contain useful extra data for selected aircraft. Currently there are following options: FlightAware and RadarBox.

Map Type

Type of map: Standard, Satellite, Hybrid

Predict Position

When selected will make an app to speculate about location of the aircraft using its speed and heading before receiving real data.

Units

Switching between different measurement units for altitude, horizontal and vertical speed, distance to aircraft. Default is feet, knots, feet per minute, miles. Metric is meters, kilometers per hour, meters per minute, kilometers.

Reference airport

ICAO code of airport, used to find distance to aircrafts. If not populated then current user location will be used for the same purpose. Also defines what airport will be used to get METAR. If not populated then airport nearest to current location will be used for that.

Transition Altitude

Altitude of aircraft above or at transition altitude shown as Flight Level, for example 39000 feet becomes FL390. Default is 18000 feet. In combination with reference airport it is also used for barometric correction of altitude received in traffic feed.

Notify about aircrafts in range

Value used to notify user about approaching aircrafts

Show User Location

When selected current location of the user will be shown on map as blue circle

Use Feed Timestamps

Use timestamps coming from **adsb_hub3** instead of local time on Mac

Server

Auto-reconnect and Compression settings should be selected to provide the best user experience

Zones

Zones are configured in **adsb_hub3** configuration using **geoevent** output. For example:

```
{ "type":"geoevent", "name":"KEWR04 approach", "latitude":"40.58", "longitude":"-74.235", "radius":"0.5", "min_altitude":"1500", "max_altitude":"3000", "command":"/bin/sh -c echo '{timestamp},{latitude},{longitude},{altitude},{callsign},{speed},{vspeed},{squawk}' >/users/realadsb/{icao24}.txt" }
```

Show on Map - when selected zones are shown on map

Proximity Alert - when selected new aircrafts found inside the zones are triggering bell sound