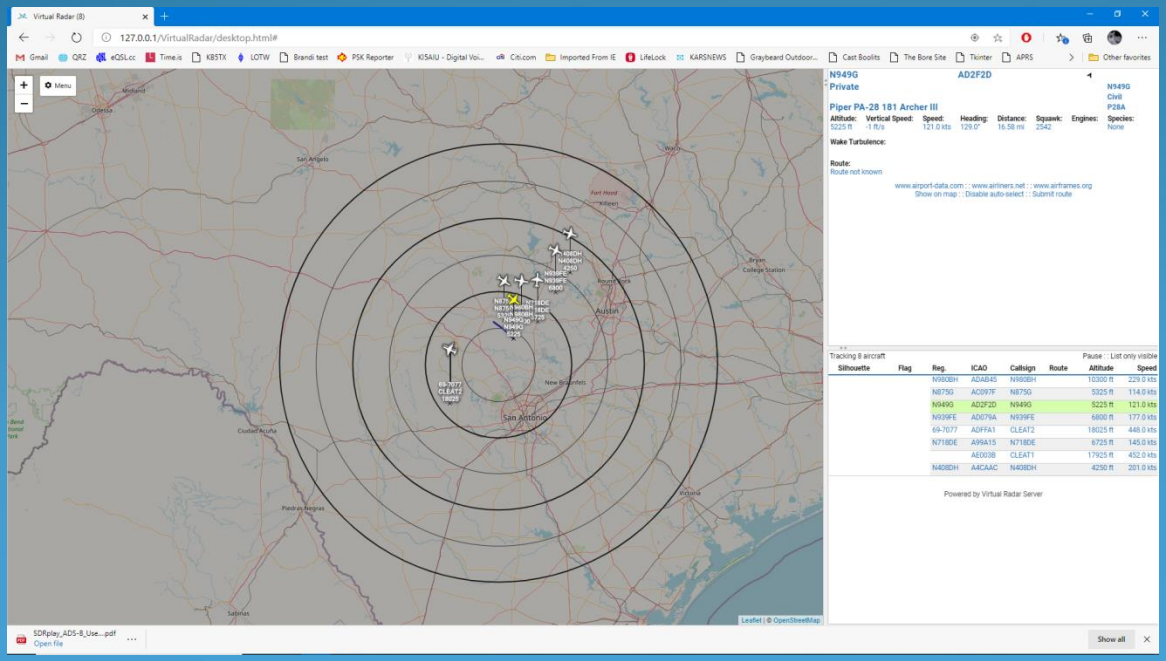
Using an SDR to track planes with ADS-B



by
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Steps involved

- The Radio
- Make the antenna
- Load the software
- Track planes

But first – ADS-B (from wiki)

Automatic dependent surveillance–broadcast (**ADS–B**) is a surveillance technology in which an aircraft determines its position via satellite navigation and periodically broadcasts it, enabling it to be tracked. The information can be received by air traffic control ground stations as a replacement for secondary surveillance radar, as no interrogation signal is needed from the ground. It can also be received by other aircraft to provide situational awareness and allow self-separation. There are several types of certified ADS-B data links, but the most common ones operate at 1090 MHz

The Radio

- This project is based around an RSP1a SDR
- The RSP1A is a 14bit SDR that covers the complete radio spectrum from 1kHz (VLF) to 2GHz (Microwaves) with up to a 10MHz visible bandwidth and the companion SDRuno software has all the popular ham bands and shortwave broadcast bands as “presets” for instant set-up.
- Used on my FTdx101D as a wide band pan adapter with cat control via SDR Uno software
- ADS-B decodes use the SDR Uno API

The Radio

- Available from Ham Radio Outlet https://www.hamradio.com/detail.cfm?pid=Ho-015965

The antenna

- Remember you tech exam?
- ½ Wavelength = 468/frequency in Mhz
- 468/1090Mhz = 0.429358 ft
- 0.429358 ft * 12 = 5.152294 in
- 5.152294 in * 2.54 = 13.08683 cm
- 13.08683 cm / 2 = 6.543413 cm (length of each portion of the dipole)

- Thanks to Dave Casler (KE0OG) https://dcasler.com/home/ for the idea on the antenna.

The antenna

- I used a piece of RG-8x with a connector on the end.
- Strip back 6” of insulation
- Push the shield back over the coax
- Slip a piece of heat shrink over the shield
- Trim center conductor and shield to 6.54cm
- Heat shrink tubing to keep shield in place
- Tube mount is optional

The antenna

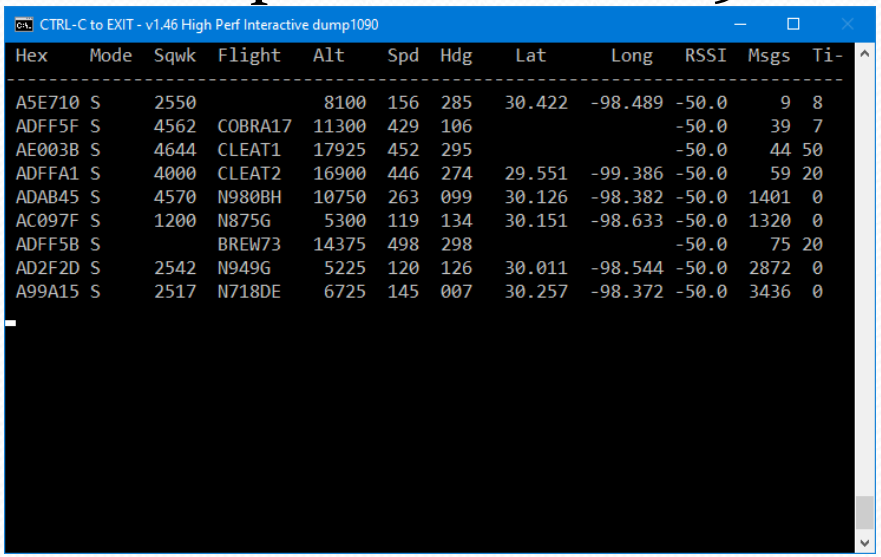
- Another view of the antenna, without the mount.

The software (SDR Uno)

- SDR Uno is available at https://www.sdrplay.com/downloads/
- This software is the SDR radio interface, and also provides the API used by the next software component (Dump1090).
- If you have an old version of SDR Uno installed, remove it and install the most current copy.

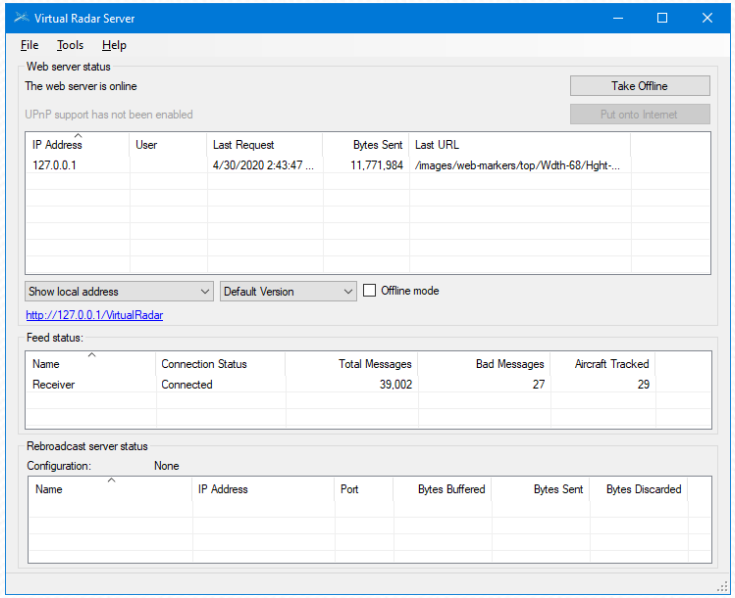
The software (Dump1090)

- Dump1090 from the SDR available at https://www.sdrplay.com/downloads/
- This strangely named software takes the ADS-B packets from the SDR, and converts them to text. Below is the output of DUMP1090.



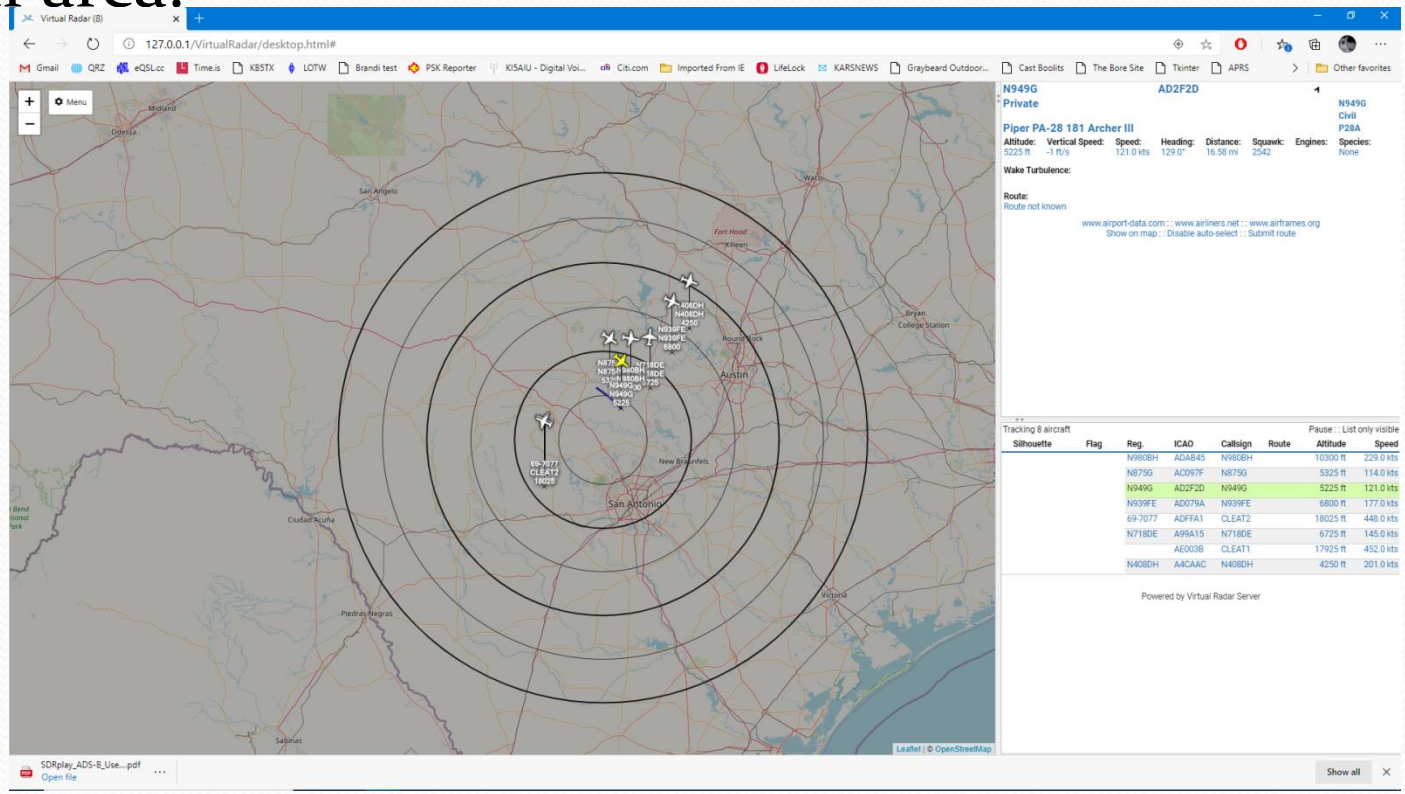
The software (VirtualRadar)

- Download from http://www.virtualradarserver.co.uk/
- This software takes the output of Dump1090, and plots it on a “radar” screen.



The software (VirtualRadar)

- Click on the link in the middle of the screen. Be prepared to set your Lat/Long to center the screen in your area.



Conclusion

- ADS-B is not limited to the RSP1A. Other SDRs can be used.
- RTL-SDR - https://www.rtl-sdr.com/a-high-performance-rtl-sdr-ads-b-receiver-build-guide/
- Review of low cost ADS dongles - http://www.radioforeveryone.com/p/group-ads-b-test-19-dongles.html