A Blog Article by

Geek Must Have

SDR Radio Tales of Woe

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Software-defined radio [SDR] is a radio communication system where components that have been traditionally implemented in hardware (e.g. mixers, filters, amplifiers, modulators/demodulators, detectors, etc.) are instead implemented utilizing software on a personal computer or embedded system. While the concept of SDR is not new, the rapidly evolving capabilities of digital electronics render practical many processes which were once only theoretically possible. This is a tale of my journey through using SDR from the very beginning.
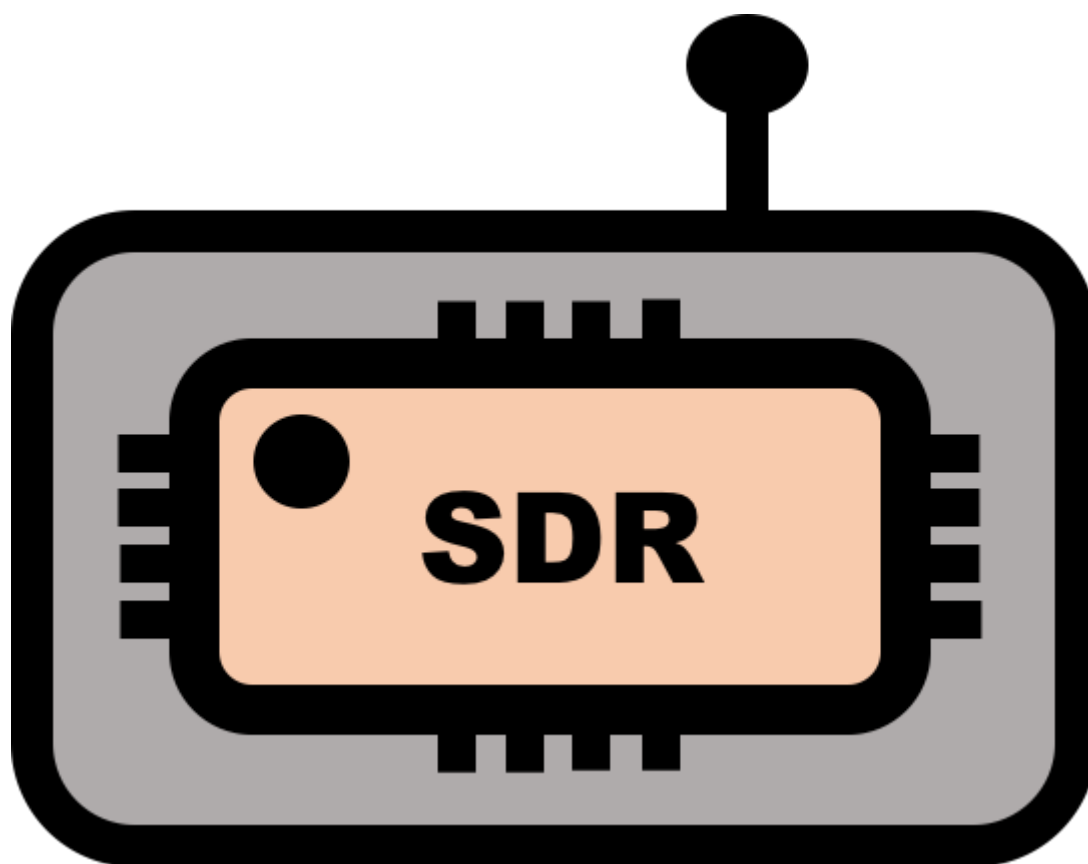
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> Yea, I did copy some of the content from Wikipedia and other sources. I did this out of necessity and speed.

1. Introduction

Recently I obtained my FCC Technicians license for amateur radio [HAM] . Call sign **KD8VON**. Thus I resumed my journey that started when I was 16 years old. A HAM operator in my neighborhood with many big antennas in the backyard, invited me to his `Shack.` The dark space in the attic was full of beautiful boxes with dials and lights and the scratchy sound of people talking. Within 10 minutes, I was talking with someone in Russia. Back then, a phone call to Russia would have been a week of my wages, cutting grass.

I was hooked. I continued with electronics and radios throughout my life. Tinkering and building

things were my escape from the `real` world. I knew enough about electronics and radio that I took the FCC Technicians test and passed the first time (Pat on the back). While this only gave me a limited range of frequencies I could use, it was a start.

A good short wave transceiver was in the range of $1,000 to $2,00. An excellent short wave receiver for all bands was still around $300-$500.

Then I discovered [SDR] where with the use of a $25 dongle and a PC, the full radio spectrum was open to me. [SDR] would fuel my obsession with police, fire, and emergency radio. I have my fair share of Radio Shack and Midland scanners.

I decided to get started again with SDR, only this time I'm taking notes. I use a regular text editor and a markdown syntax called [ASCDoctor] to help create what appears to be a very structured and fancy formatted document and web site.

2. Hardware

A few years back, I purchased a few SDR devices, thinking I would use them immediately, alas `life` got in the way.

Recently after some frustration with the older SDR devices, I purchased a newer SDR dongle device

2.1. Aliexpress

She was purchased back in Jan 2016 for $40.00.

Figure 1. Aliexpress SDR

Reference: Aliexpress Order

Manual: The so called `Manual` for this device can be viewed at this Link

3. Installation

3.1. USB Drivers

The USB drivers for SDR devices are the most challenging part of getting started using [SDR]. There are some tricks to make this more manageable, including using <<>ZADIG>> USB driver installation.

Reference: Zadig web site

The current Windows version (3.5) of the Zadig zip file can be downloaded from this link::./files/zadig-2.5.exe[Link]. This utility is the executable file; no installation is needed.

3.2. SDRPlay Version 1.0

3.3. RTL-SDR

3.3.1. Dipole Manual

Dipole Manual can be viewed at the following link

3.3.2. Dipole Calculator

Reference: http://www.csgnetwork.com/antennaedcalc.html

4. Glossary

ASCDoctor

Asciidoctor is a fast, open-source text processor and publishing toolchain for converting AsciiDoc content to HTML5, DocBook, PDF, and other formats. Asciidoctor is written in Ruby and runs on all major operating systems. The Asciidoctor project is hosted on GitHub.

Reference: [ASCIIDoctor Getting started](#)

DSP

Digital Signal Processing, A digital signal processor (DSP) is a specialized microprocessor chip, with its architecture optimized for the operational needs of digital signal processing.

DIRECT

Digital enhanced cordless telecommunications (Digital European cordless telecommunications), usually known by the acronym DECT, is a standard primarily used for creating cordless telephone systems. It originated in Europe, where it is the universal standard, replacing earlier cordless phone standards, such as 900 MHz CT1 and CT2.[1]

GSM

The Global System for Mobile Communications (GSM) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile devices such as mobile phones and tablets. It was first deployed in Finland in December 1991.By the mid-2010s, it became a global standard for mobile communications achieving over 90% market share, and operating in over 193 countries and territories.

HAM

Amateur radio operators are also known as radio amateurs or hams. The term "ham" as a pejorative nickname for amateur radio operators was first heard in 1909 by operators in commercial and professional radio communities. The word was subsequently embraced by the operators, and stuck.

Osmocom

Osmocom (open source mobile communications) is an open-source software project that implements multiple mobile communication standards, including [GSM], [DECT], [TETRA] and others.

RTL-SDR

It has been discovered by Eric Fry that some common low-cost DVB-T USB dongles with the Realtek RTL2832Ucontroller and tuner, e.g. the Elonics E4000 or the Rafael Micro R820T, can be used as a wide-band (3 MHz) SDR receiver. Recent experiments have proven the capability of this setup to analyze perseids shower using the graves radar signals. This project is now being maintained at Osmocom.

SDR

Software Defined Radio, Software Defined Radio attempts to place much or most of the complex

signal handling involved in communications receivers and transmitters into the digital [DSP] style.

TETRA

Terrestrial Trunked Radio (TETRA; formerly known as Trans-European Trunked Radio), a European standard for a trunked radio system, is a professional mobile radio and two-way transceiver specification. TETRA was specifically designed for use by government agencies, emergency services (police forces, fire departments, ambulance) for public safety networks, rail transport staff for train radios, transport services, and the military.

ZADIG

Zadig is a Windows application that installs generic USB drivers, such as WinUSB, libusb-win32/libusb0.sys or libusbK, to help you access USB devices. It can be especially useful for cases where:

1. you want to access a device using a libusb-based application
2. you want to upgrade a generic USB driver
3. you want to access a device using WinUSB

5. Document History

Table 1. Document History

Date	Version	Author	Description
01/07/2021	V2.1c	JHRS	Added installation
01/05/2021	V2.1b	JHRS	Initial version