



**Coconino Amateur Radio Club**

[www.cocoradio.club](http://www.cocoradio.club)

# High-Country Static

May 2017

News and Information Concerning  
Amateur Radio in Northern Arizona and  
Beyond

Welcome to the Coconino Amateur Radio Club (CARC) Monthly Newsletter. CARC is a non-profit club devoted to providing communication services to local volunteer agencies and events. Meetings are held the second Thursday of each month at the East side Sizzlers Restaurant Highway 66 at Fanning Dr. Flagstaff, at 7:00PM. All persons interested in amateur radio, whether licensed or not, are welcome to attend.

*Coconino SkyWarn meets 1900 every Monday evening on the 146.98 repeater and at 1930 on the Navajo Mountain CACTUS repeater and 146.480 simplex.*

*Coconino ARES meets 1900 every Wednesday evening on the 146.98 repeater and at 1930 on the Navajo Mountain CACTUS repeater and 146.480.*

## Officers:

President: Tom Shehan KY7WV

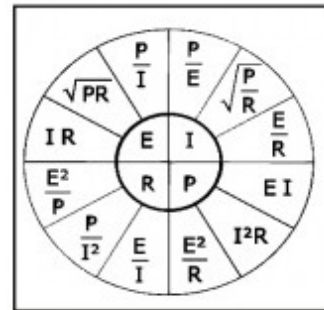
Vice-President: Sandy Meadowcroft KF4JHC

Secretary: Erv Perelstein, KE7QFI

Treasurer: Pat Traber, KE7QFG

PIO: Vacant

Newsletter: Janice Enloe, KI6WCK



E = voltage I = current  
R = resistance P = power

## From our Club President:

The most exciting part of being a CARC member is the support we provide to our local communities. It is our communications support that enables many community events to occur. With our support, charities can raise money for those in need, citizens can engage in community events, and people can participate in challenging physical activities for fun, sport, and show. In times of emergency, we are the ones standing by to provide critical communications. And all of this is done at no cost to any of these organizations. We are volunteers and are willing, happy, and proud to provide our skills and equipment to benefit all.

My ask is that all club members participate in our volunteer efforts. You will find it rewarding and fun. The comradery of working together builds a sense of purpose and accomplishment personally and as an organization. The benefit of volunteering is a wealth to be shared by all – not enjoyed by just a few. All volunteers are supported by their teams.

As we review the needs for the events we support and for the upcoming Field Day, not a single member (licensed or not) should be left out. With every member volunteering, CARC will continue its proud tradition of supporting our communities. I ask that every member volunteer for an event. You

will make something good happen, you will enjoy it, and you will make a difference. I believe that is why you are a CARC member.

73,  
Tom, KY7WV  
CARC President

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## Calendar of Events for 2017:

### April

22 Amateur Radio Examinations at Northern Country Health Care

### May

?? Arizona ARES/RACES Full Scale Exercise

12-14 Overland Expo: Demonstrations and Amateur Radio License Examinations  
At Fort Tuthill

28-29 Red Cross Exercise

### June

3 Sacred Mountain Prayer Run

24-25 Field Day (KG7OH & Team)

### July

4 Munds Park Parade

16? Snow Bowl Hill Climb

22 Amateur Radio License Exams at North Country Health Care

### August

1 National Night Out (First Tuesday in August)

5 Toys for Tots/Fat Tire Bicycle Ride

12 Big Brothers/Big Sisters Run for the Magic

27 Arizona Trail Marathon at North Rim

### September

4 Williams 10K Labor Day Run

23-24 Flagstaff to Grand Canyon 100 Mile Run

### October

14 Soulstice Mountain Trail Run

21 Amateur Radio License Exams at North County Health Care

?? MARS COMEX

### November

?? Arizona ARES/RACES Full Scale Exercise

11? Girls on the Run

### December

2 SkyWarn Recognition Day at NWS Belmont (UTC date)

10? Christmas party

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## Thank you and Help Wanted:

Thank you to all who have run the Monday and Wednesday night nets:

Flagstaff: Tom KY7WV, Erv KE7QFI, Mike KD8RQV, Bob KF4RKS, Mary Lou Hagan, KG7TPK  
Mike Clever, KD8RQV, Phil Brunner, AE7OH

Page: Eric Kg7UNI, Nancy KG7WKS and Vince WB7UWW

If anyone one would like to help with the nets, please let Tom know. It is good practice for radio skills and the script is written for you to use.

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## Licensing Exams for 2017:

Remember to bring your HAM license and a copy (if you are upgrading your license), a government issued picture ID, a black ink pen, calculator with memory erased and fifteen dollars (exact change is appreciated).

May14 Overland Expo: Demonstrations and Amateur Radio License Examinations  
At Fort Tuthill

July 22 Amateur Radio License Exams at North County Health Care

October 21 Amateur Radio License Exams at North County Health Care

<http://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>

**Arizona Newsletter:** <http://www.arrl.org>

**Tutorials:** <http://www.arrl.org/tutorials>

[http://www.arrl.org/exam\\_sessions/flagstaff-az-86004-1221-2](http://www.arrl.org/exam_sessions/flagstaff-az-86004-1221-2)

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## Next Business Meeting:

Our next business meeting will be May 11, 2017 at the East side Sizzlers at the corner of Highway 66 and Fanning. Dinner @1800 and meeting starts @1900.

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## Minutes of the Coconino Amateur Radio Club

**4/13/2017**

Meeting Started: 0200Z, 4/14/2017

**Secretary's Report:** Since the minutes of the March meeting were published in the newsletter there was no need to read them. Scott Martin made a motion and Ken Held seconded the motion to accept the minutes. They were approved unanimously.

**Treasurer's Report:** Pat Traber, our CARC Treasurer, was not in attendance. The closing bank balance was \$4,739.29. This balance contained the income from the sale of the tower, antenna, etc that was donated by Bill Smith. Many THANKS to Bill. Membership is 49 members, consisting of 45 paid members and 4 lifetime members. Mike Clever moved and Gary Loving seconded a motion to accept the Treasurer's Report. Approved unanimously.

**President's Report:** After Introductions, Tom Shehan, our CARC President, announced that a spreadsheet was being prepared for sign-ups on races and Field Day 2017 activities. There will be another meeting of the Field Day Team on May 20th. He urged members to volunteer for races and Field Day to practice radio procedures and have fun.

**Vice President's Report:** Sandy Meadowcroft, our CARC Vice President, had no report this month.

**Old Business:** Tom reminded us that the position of Public Information Officer for CARC is still unfilled and he asked for volunteers. He pointed out that the position can be shared to reduce the burden on one person and that ARRL has an online class for the PIO position. Nominations should be sent to Sandy or Tom.

Congratulations to Gary and Mark Loving winning the bidding on the Tower, which sold for \$2,200.00. The club wished them good luck on installing and using their new equipment.

Tom also reminded us that the Technician License Classes are progressing well and we are nearing the end of classes. Classes are held in North Country Health Care's Eric Community Room. Sandy on said that it is important for the club to hold these classes each year as a community service and to expand the Amateur Radio population. The next class will be on 4/22, followed by 4/29, 5/6 and 5/13.

Tom updated us on the Memo to Race Directors and thanked all that sent suggested changes or additions to him. He has already sent two memos out to this year's race directors. The assembled members thanked Tom for his efforts on this important Memo.

Tom reminded us that CARC has a Facebook page and we should check it out for some good information. Phil Brunner is in charge of this page. Any questions can be directed to him. If you have any questions about our CARC mailing list, please contact Gary Loving who maintains the list for us.

We received a letter from DX Engineering offering to provide a Power Point presentation program for our club. The presentations will last from 30-45 minutes via SKYPE and will allow time at the end for questions. It was agreed that we would request a presentation.

Tom opened a discussion on the upcoming 2017 Field Day. A new addition this year will be a large map to post contacts on. The next meeting of the Field Day Committee will be on May 20th at the Main Public Library. It was noted that this date conflicted with the proposed CARC Picnic. Tom and Sandy said they would work on changing the Picnic date, more info to follow.

Sandy suggested that we change the caterer for Saturday Dinner at Field Day. She recommended Big Foot BBQ, the price would be \$10.00 per person. The members voted to change to Big Foot BBQ. Additional snacks of chips, veggies, fruit and brownies will also be provided.

## **Schedule:**

### **April**

?? AZ State Races Exercise, date will be provided when finalized.

### **May**

12-14 Overland Expo and Amateur Radio License Exam has been moved to Fort Tuthill. Scott reported that there are limited passes this year and our location has yet to be determined.

28-29 Red Cross Exercise, Tucson Chapter primary. Erv will try to get more info.

### **June**

3 Sacred Mountain Prayer Run, Bob Meadowcroft will be coordinating.

10 New proposed date for CARC Picnic. Need to confirm location availability.

24-25 Field Day, Ron Gerlak coordinating.

### **July**

4 Munds Park Parade, Pat coordinating.

16 Snowbowl Hill Climb - Cancelled for this year.

22 Amateur Radio License Exams - North Country Health Care, Eric Community Room. Joe coordinating.

## **August**

1 National Night Out, no coordinator yet.

5 Toys for Tots/ Fat Tire Bicycle Ride, Tom and Mike Clever coordinating.

12 Big Brothers Big Sisters Half Marathon, Bob Meadowcroft coordinating.

27 AZ Trail Marathon at North Rim, Tom has not heard from race management yet.

## **ARES Report**

Exercises: Races, still not sure of date, Red Cross, still trying to get information.

Trouble in Williams this week, police chase, shots fired.

Joe again asked that more members sign-on to Skywarn and ARES nets to practice directed nets for races and emergencies.

Joe found a Triband Beam Antenna on a house in Kachina Village that appears to be abandoned or no longer used. He will find out more info and let us know.

**50/50 Drawing:** Mark Loving won the 50/50 raffle.

There being no further business, Scott moved and Mike seconded a motion to adjourn. Passed unanimously.

Meeting Ended: 0326Z, 4/14/2017

**Presentations:** No additional presentations this month.

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## Software Defined Radios and Why We Should Be Interested

When QST editor Steve Ford reviewed the ICOM IC-7300 Software Defined Radio he predicted:

“The IC-7300 takes the familiar ergonomic design of an analog transceiver and blends it seamlessly with software defined radio technology — all at a moderate price. I have a feeling that this approach to amateur transceiver design is likely to spread rapidly, even to lower-end models.”

From Wikipedia ([https://en.wikipedia.org/wiki/Software-defined\\_radio](https://en.wikipedia.org/wiki/Software-defined_radio)):

“In the long term, software-defined radios are expected by proponents like the SDRForum (now The [Wireless Innovation Forum](#)) to become the dominant [technology](#) in [radio communications](#).”

So, what is a Software Defined Radio or SDR? Again from Wikipedia:

**Software-defined radio (SDR)** is a [radio communication](#) system where components that have been typically implemented in hardware (e.g. [mixers](#), [filters](#), [amplifiers](#), [modulators/demodulators](#), [detectors](#), etc.) are instead implemented by means of 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 used to be only theoretically possible.

A SDR is more of a digital computer than a traditional analog radio like most of us use. The best feature of a SDR is it can be modified after manufacture to add improvements and correct any errors. In the radios that I grew up with, after manufacture it was not economically practical to modify the coils, capacitors, and filters that gave the radio its “personality”. A SDR’s performance can be changed by uploading a new version of the control program - similar to updating your favorite computer application.

Are SDR radios any good? They can be very good. Rob Sherwood of Sherwood Engineering tests amateur radio receivers for performance, and he thinks they are. Here is his analysis of many radios with receivers that will help you hear that “weak one”. The best performers are at the top of the list:

<http://www.sherweng.com/table.html>

Note that the top rated radio is a SDR, and the second rated is a hybrid. The top rated radios work especially well during contests, at Field Day, and at a DX expedition. Rob specifically tests receiver performance under simulated busy band conditions. He follows the premise that “if you can’t hear them, you can’t work them.”

The top rated radios require a good size piggy bank, so how does one gain experience with SDRs? The SDRPlay (available at HRO and others) is a great wide range receiver. For your next HF transceiver, consider the ICOM IC-7300; several members of the Arizona emergency and traffic nets have these radios; they ALL like them. We plan to have an Elecraft K3 at Field Day for the 6 meter station. Stop and take a look. Perhaps visit the Thunderbird Field Day station to see the Flex Radio Systems SDRs.

I am currently experimenting with a HobbyPCB SDR 5 watt transceiver. There are some performance trade-offs in this low priced radio; I will report as I gain more experience and see improvements. Like many SDRs, this transceiver requires a computer running HDSDR or other SDR program.

Joe

Some Software Defined Radios:

ICOM IC-7300

Elad FDM-Duo

Elecraft KX2, KX3, and K3 (hybrid)

Microtelecom Perseus

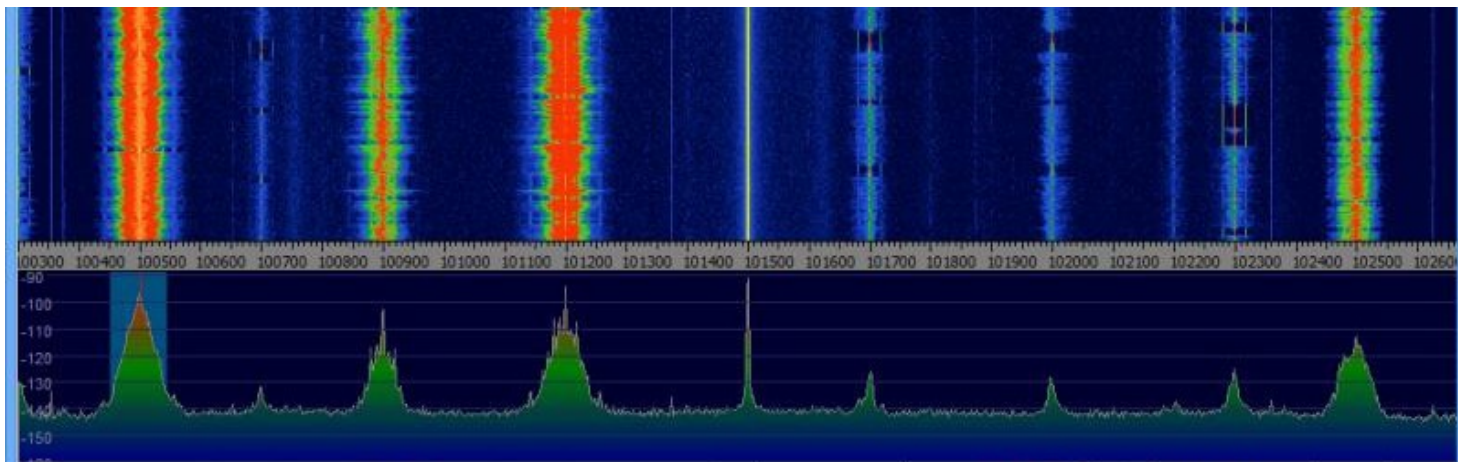
Apache Labs Anan 10E

Flex Radio Systems

SDRPlay (popular wideband receiver)

Many “dongles” have been used to make a SDR receiver

## Why You Should Care About Software Defined Radio



It hasn't become a household term yet, but Software-Defined Radio (SDR) is a major player on the developing technology front. Whether you're building products for mass consumption, or just playing around for fun, SDR is worth knowing something about and I'll prove it to you.

### SDR Boils Down a Hard Problem

First off let's reconcile what is meant by "radio". If it sends or receives via radio frequency it has a radio in it. This means your WiFi router, your cellphone, your laptop, many water and electrical meters, your garage door opener (but not your TV remote, that uses light), wireless security system sensors, police radios, your wireless mouse/keyboard, and that quadcopter you keep crashing in the neighbor's yard all have one. Radios are so prolific we're tempted to tell you they're in absolutely everything.



Ettus Research USRP N210

Radio used to be a lot harder. On the communications side of things you could buy an expensive radio receiver and/or transmitter that required a skilled operator to use. At a lower level, you would be looking at choosing a specific band and dealing with things like modulator, mixer, and filter design, along with plenty of roadblocks to manufacturing which would also lock you into a specific application.

Software-Defined Radio solves some of these problems by allowing you to control how the radio hardware functions based on software. The advent of this has also been boosted by the availability of inexpensive hardware produced at scale. It is not the end-all of radio, but it makes the problem easier. That has led to wider adoption but we think what has been seen so far is only the tip of the iceberg.

Seen here is the USRP N210 which is a professional tool used by hardware developers that work with RF in their products. This tool proved to be so popular that National Instruments bought designer Ettus Research and now incorporate the USRP with their LabVIEW systems. The midrange USRP-210 model is a very capable SDR, operating DC to 6 GHz.

## You Can Change It After It's Built



Florian Fuchs CC-BY-SA 3.0 [via Wikimedia Commons](#) The whole point of SDR is less need for specialized hardware. One module can address a wide range of uses, even those that are currently unknown. Building and shipping hardware has high overhead, but formulating and distributing software (or firmware) updates may have much lower associated costs. Devices communicating using SDR don't lock a platform into one specific set of communications. For instance, if you sell a base unit and multiple remote units, switching up the communications method in version 2 could render older hardware useless. You will have happy customers if they can continue using their old accessories after a simple upgrade. It's entirely conceivable that such upgrades would be pushed over the air (like from a base unit) as is seen with many smartphones.

The multiplier is, of course, crowd-sourcing development. One forecast of the future is a connected world. If device firmware has been released as Open Source, a motivated community will find a way to make that hardware even more useful.

In the next section I'm going to talk about the DVB-T dongle seen here. But one important thing to realize about it is that the chip inside this device is an SDR and is already in use commercially. The versatility of the chipset inside proves the point that SDR is a viable choice in consumer hardware. I'd love to see reliable numbers on how many of these have been sold to watch television, versus to tinker with SDR. Either way it's great for the companies churning them out.

## Start Learning for a Few Dollars

Don't be ashamed if you know next-to-nothing about all of this. That's where most people stand, and you don't have to spend big or know much to dabble in SDR. Let's face it, wireless communication is as close as a pragmatic mind will get to calling something "magic" and that makes SDR a delight.

### Starting Simple

The thing that really turned my head was the advent of what is known as RTL-SDR. This is the practice of using television tuner USB dongles for Software-Defined Radio. That's right, these "DVB Sticks" are made to watch broadcast television on a computer but inside is a Realtek 2832U.





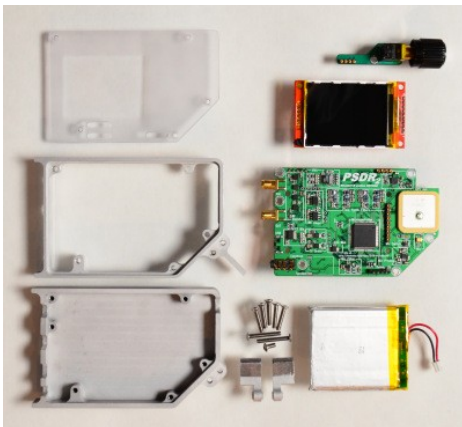
SatNogs satellite receiver is based on a DVB-T Dongle and SDR

Connecting the dongle to your computer and launching some software allows you to listen in — both audible signals and transmitted data — on all kinds of things. We’ve enjoyed reading [Dr. Droopy Nayhey’s] [SDR guide on Hackaday.io](#) because he’s taking this route. \$12 in hardware (plus the computer and cables to be fair) and he’s tracking aircraft, listening to emergency band, FM radio, and “treasure hunting” for all the things in our world that are transmitting.

Don’t be afraid of this, these are receivers-only so you need no license or prior training. We’ve seen these morph into [automated airplane filming rigs](#) and you could end up adding to [the flight tracking data network of FlightAware](#). The Grand Prize winners of the 2014 Hackaday Prize even [built a satellite receiving station around a DVB dongle](#)! See that little black stick centered vertically? Satellites do transmit information back to earth, [you just need to listen for the data](#).

For getting started, and well-targetted applications, these dongles are a good option. But they are limited from around 22MhZ to 2200Mhz depending on which particular dongle you have. Going beyond those limits requires a jump to different hardware.

## Getting More Serious



Parts that make up PortableSDR

Earlier I said that SDR solves some problems but certainly not all. One device can’t rule all RF communications (yet). So those getting a bit more serious look to purpose-built SDR rather than piggy-backing on those TV receivers. This is still better in many ways than radio equipment of yore, as these boards boasts a highly versatile set of features.

Here we see an interesting take on SDR which [placed 3rd in the 2014 Hackaday Prize](#). PortableSDR does away with the need for a computer to drive the software side of things and puts the circuitry in a durable case with a dedicated display as part of the user interface. It is aimed at people who are getting more serious about amateur radio, but as it stands is still a receive-only instrument.

On Monday we [made an appeal](#) for a Cinderella-story finish for [the PortableSDR Kickstarter](#). I'm still hoping that this one makes it as I do believe it's part of the modernization of the amateur radio movement.

Another example of that rebirth is SDR equipment specifically designed for amateur radio operators. [We've been watching](#) one such build [as it progresses](#). This one centers around a [Softrock SDR board](#) which is controlled by a Teensy 3.1 and again, has a dedicated user interface that requires no computer. Notice the convergence here between traditional ham radio skills and the hacker movement?

## Conclusion

Need I say more? There's a growing movement of people who are playing with SDR. That will lead to interesting new applications and I believe it will eventually drive consumer electronic design. But if you need more inspiration, just look at [the kinds of things people are building around SDR](#) and make your own predictions.

[Featured image source: [HDSDR.de](#)]