President's Corner

Virtual ARRL/TAPR DCC, Sept. 17-18

The 40th Annual ARRL and TAPR Digital Communications Conference (DCC) will be a virtual conference on September 17 and 18, using Zoom video communications and YouTube video-sharing platforms.

Registered DCC attendees participating via Zoom will be able to interact with presenters and other attendees via a chat room as well as raise a virtual hand to ask questions. To register, go to https://tapr.org/product/virtual-dcc-registration/ (you don't need a Zoom account to register).

DCC registration is free for TAPR members and $30 for non-members. Members receive a 100% discount at checkout.

Non-members who would like to join TAPR and receive the free DCC pass can simply add TAPR membership and DCC registration to their shopping carts. After checkout, they will receive the free DCC pass when their membership is processed.

Non-registered DCC attendees can watch the live stream for free on YouTube, however, non-registered DCC attendees will not be able to ask questions or chat. No registration is required for YouTube access (the YouTube URL will be announced and posted on the TAPR website preceding the DCC).

Call for Papers and Speakers

Technical papers are solicited for presentation at the DCC. Papers will also be published in the Conference Proceedings. Authors do not need to present at the conference to have their papers included in the Proceedings. Submit papers to Maty Weinberg, KB1EIB (kb1eib@arrl.org) via e-mail by August 15, 2021. Papers will be published exactly as submitted and authors will retain all rights.

Conference papers will be distributed as pdf's to participants. Printed copies of the papers will be available for sale at Lulu.

Also, speakers are invited to make presentations on topics of interest without submitting papers for the Conference Proceedings.

All speakers and presenters must contact Steve Bible, N7HPR (n7hpr@tapr.org) to reserve a slot for your presentation. Indicate whether you need a 15- or 30-minute slot and if you need to present on a specific day (Friday, September 11 or Saturday, September 12). A pre-recorded presentation can be submitted in lieu of a live virtual presentation.

Paper and presentation topic areas include, but are not limited to software defined radio (SDR), digital voice, digital satellite communication, digital signal processing (DSP), HF digital modes, adapting IEEE 802.11 systems for Amateur Radio, Global Positioning System (GPS), Automatic Position Reporting System (APRS), Linux in Amateur Radio, AX.25 updates, Internet operability with Amateur Radio networks, TCP/IP networking over Amateur Radio, mesh and peer-to-peer wireless networking, emergency and homeland defense backup digital communications in Amateur Radio.

Lightning Talks

Ad hoc "lightning talks" on various topics of interest will be announced throughout the DCC. Registered attendees will be able to participate in any lightning talk that whets their appetite.

Hardware and Software Demos

Hardware and software demonstrations will be conducted during the DCC by means of Zoom's breakout room feature.

Hope to Zoom you at the DCC!

73,

Steve Bible, N7HPR

TAPR President

###

TAPR Directors Election

Three Director positions on the TAPR Board of Directors are now open for nomination and nominations may be submitted now.

TAPR Board members serve three-year terms and their responsibilities include:

1) Attendance at both in-person board meetings each year. [One is held at the Hamvention in May, the other at the Digital Communications Conference (DCC) in September.]

2) Regular participation in the continuous board session, which is conducted over the Internet.

3) Active engagement in TAPR's management.

To place a person in nomination, please remember that he or she must be a member of TAPR. Also, confirm that the individual is willing to have his or her name placed in nomination. By September 12, 2021, send that person's name (or your own if you wish to nominate yourself), call sign, mailing address, e-mail address, phone number(s), and a biographical sketch (250 words maximum) via contact@tapr.org or via snail mail to TAPR, 1 Glen Ave., Wolcott, CT 06716-1442..

Nominations close after the call for nominations at the TAPR Membership Meeting at the DCC on September 18, 2021, and an online election will be held from October 2, 2021 to October 15, 2021.

###

TAPR Wear Available

Personalized Land's End clothing with the TAPR logo and your name and call sign are now available from the TAPR Store at

http://business.landsend.com/store/tapr/

Select from the Men's or Women's catalog. (To make shopping easier, there are "TAPR Recommended Shirts" in the Men's catalog including two styles of polo shirts, each available with or without pockets.)

The logo is available in three colors -- red, blue and white. The name/call sign monogram thread will match the logo color. (We recommend that you use the white logo with dark colored shirts.)

Prices are very reasonable, for example, after adding the logo and monogram, a mesh pocket shirt is $39.85 plus shipping and sales tax where applicable. Processing time is 5-7 days.

###

ARDC Helps Oregon HamWAN Build its Backbone

By Dan Romanchik, KB6NU, ARDC Content Manager

Amateur Radio Digital Communications (ARDC) is a non-profit private foundation formed to advance the state of the art in amateur radio, support the growth of amateur radio, and invest in technical education related to communication science. In 2019, we began to contribute funding (https://www.ampr.org/giving/) that will further these and related goals. In 2021, we aim to award more than $6 million to worthy organizations, groups, individuals and projects.

ARDC grant helps ham radio respond to disasters

One example of how we support expansion of amateur radio infrastructure is the grant we awarded to Oregon HamWAN (http://www.oregonhamwan.org/) to bolster amateur radio's ability to respond to disasters in the U.S. Northwest.

Major earthquakes are always a possibility in Oregon. When one occurs, Internet, landline and cell phone communications are likely to be disrupted. These disruptions effectively cut communication between volunteers, first responders, hospitals and government agencies at a time when communication is most critical.

This is a situation in which amateur radio can play a vital role. Unfortunately, voice communication is slow and traditional digital communication modes, such as Winlink, have limited bandwidth. To get around these limitations, Oregon HamWAN plans to set up portable HamWAN nodes in affected communities, allowing emergency management agencies to communicate effectively via high-speed email using HamWAN.

HamWAN technology supports high speed Internet connectivity (over 100 Mbps between backbone distribution sites and up to 10 Mbps to each client node) over amateur radio using the 5.8 GHz band. Since HamWAN requires line of site communication, an effective HamWAN network requires deployment of HamWAN backbone distribution sites on towers. HamWAN supports a range of up to 50 miles between towers.

The value of HamWAN is that it allows amateur radio operators to set up mobile or portable HamWAN nodes, which can be aimed toward the nearest HamWAN distribution site to provide emergency communication via the Internet during disasters. A mobile or portable HamWAN node consists of equipment costing less than $100, as well as an inexpensive WiFi router and a 12V battery.

To set up this network, ARDC awarded Oregon HamWAN $88,391. With this money, Oregon HamWAN plans to deploy 12 HamWAN backbone distribution sites between Portland and Salem, Oregon, to extend the Puget Sound Data Ring, which currently extends from Vancouver, Washington, to Seattle. When completed, the network will extend from Vancouver, Washington, to Salem, Oregon. The grant also includes funds for equipment that will be used for education and demonstration purposes.

Do you have a big idea?

ARDC (https://www.ampr.org) is committed to making things happen. If you have a big idea that you'd love to make real, apply for a grant! Learn more at https://www.ampr.org/giving. If you have questions or need help with your proposal, we're here to help – reach out to giving@ampr.org. No inquiry is too small or too large. You can also keep in touch with ARDC by subscribing to our monthly email newsletter (https://www.ampr.org/subscribe-to-the-ardc-newsletter/).

###

Donate to TAPR

TAPR is now participating in the AmazonSmile program!

When you shop using the AmazonSmile program, Amazon makes a donation to TAPR equal to 0.5% of the price of your eligible AmazonSmile purchases.

AmazonSmile is the same Amazon you know. Same products, same prices, same service.

Bookmark the TAPR AmazonSmile Program link:

https://smile.amazon.com/ch/86-0455870

That link takes you to a special login portal where you enter your normal Amazon credentials and get redirected at the same Amazon home page except there will now be a notice that you are supporting TAPR.

Other ways to donate to TAPR, email contact@tapr.org:

###

Back to the Basics of APRS

By David Dobbins, K7GPS

It was 1993 when I first learned about APRS, the Automatic Packet Reporting System[1] created by "Father Bob" Bruninga, WB4APR. I was in my first year of ham radio and active duty Navy living in land-locked San Angelo (Goodfellow AFB), Texas.

I had familiarity with the Navy's LINK-11 and LINK-14 plotting systems that Bruninga had much experience with and was "exporting" to ham radio. It was easy to grasp the concept and operation of APRS. If you were with us back then, you'll remember the weekly updates to APRSdos that we responded with 45-minute long distance phone calls to download via from Bob's BBS systems at 14400kbps to our Win3.1/DOS computers. Those were the days!

OK, so I don't run APRSdos anymore, but I still have the Win3.1 color laptop stuffed somewhere in case I wanted to. If you used APRS in San Angelo, Tucson, San Diego or Oahu, you used some of the vectored maps I created for APRSdos before I moved on to the more popular apps using disk and Internet-based maps. I eventually landed on UI-View32 and operated it for many years after the app was no longer developed (due to the author Roger Barker, G4IDE's passing) and discontinuance of the disk-based Precision Mapping maps.

Moving forward to late 1996, I had retired from Naval service and moved to Washington state. There were a handful of us interested in advancing APRS in the northwest. Our small group set out to contact digi owners and ham radio clubs to increase activity in this fascinating part of our hobby.

Figure 1, Balloon tracking

Figure 2. SAR dog with tracker

Figure 3. Motorcycle tracker

Packet interest was waning, so when APRS came along it was a no-brainer for many to convert their mountaintop digis to APRS functionality. We grew and grew some more and expanded beyond the Washington borders. We created a support group, the Northwest APRS (https://nwaprs.info) website that has recent updates and now helps APRS enthusiasts in Montana, Idaho, Oregon, Washington, and the nearby Canadian provinces of British Columbia, Alberta and The Northwest Territory.

In reality, we offer support and encouragement to anyone interested in APRS. We hold an annual NWAPRS Summer Gathering now in its 24th year at Valley Camp in North Bend, Washington, just off Interstate 90, over the first weekend after Labor Day. Our next gathering is scheduled for Sept 10-12, 2021. Check our web pages for updates.

Jumping to 2021, there have been at least a dozen different APRS applications for all the major operating systems. Many have ceased development as their authors either moved on to other projects, or never gathered enough momentum to keep the effort going. For those that continue development, thank-you for keeping APRS going strong in ham radio events and activities.

I want to share some recent research on resources used in APRS and where to find there. Let's get started.

I've found many people interested in APRS first want to set up a mobile station in their vehicle, motorcycle, bike or person. We've come a long

Figure 4. APRSdos of Idaho Falls

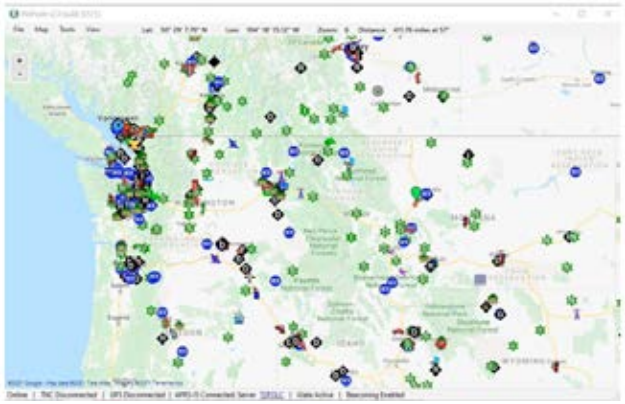


Figure 5. New NWAPRS coverage map

way from the old ammo cans with a big heavy battery, HT or single-band mobile radio, Kantronics KPC-3 TNC and DeLorme or Garmin III GPS. You wouldn't want to lug that around all day.

My "best" category mobile tracker has been a Kenwood TM-D710A dual band APRS-ready radio. The newest D710GA has GPS installed in the control head eliminating the need for an external GPS, commonly the Italian AvMap G6 GPS. You'll get 50 watts out on the APRS 144.39 MHz frequency on one side of the radio and still have the other side for 2m/440 voice communications on the other side.

Yaesu has a similar radio, the FTM-400DR, and Alinco offers DR-135TP radio that has room for a TNC chip to allow for APRS operations. Add just about any dual band antenna and off you go.

Once your radio is properly configured with your call sign and SSID, path and periodicity setting, good GPS fix and the BCON button activated, you'll be on the air with signals very likely to reach the APRS-IS so it can be seen on the Internet.

If you want a less-costly solution, take a look at the Byonics.com series of trackers, Argent Tracker2 series, QRP-Labs.com LightAPRS, or even an HT like the recently discontinued Kenwood TH-D74 (chip fire in Japan), with an external antenna that will blast your position signals out.

Alinco has the DJ-MD5TGP HT with APRS functions and Yaesu has the FT-3DR to round out a nice selection of APRS-equipped radios. The AnyTone AT-D878UV HT has APRS TX over RF and VoiP transmit,

Figure 6. Hawaii SET Hurricane Iwa

Figure 7. Byonics trackers

but no TNC to decode any receive signals. You'll at least be able to get signals into the APRS-IS, which is a primary goal of using APRS for tracking assets.

The Icom ID-31A, 51A, and forthcoming 52A can likewise transmit an APRS-formatted position report to the APRS-IS and the 52A may have full APRS capability, although I have not seen that in writing yet.

There are an abundant number of miniature trackers that transmit low power and may be best configured with an external antenna and nearby digipeater to get signals into the APRS-IS. Byonics.com has my number as I use their trackers in the wife's vehicle, my Harley Davidson Road King, a beach cruiser bike and high altitude balloons when I did those projects. The AVRT AVT510 is an all in one miniature tracker if that's what you need, and TrackSoar.com has some great all-in-one project boards for mounting in the high altitude balloon projects.

OK, so you have a dozen trackers going now on your vehicles, toys and projects, but you can't see what they're doing or where they are because you don't have a monitoring solution yet. Next comes the home for mobile FULL-APRS station requirements, which usually begin with a computer running a flavor of APRS. While there are still quite a few UI-View32 users out there with the Precision Maps v9.0 North American maps, it was over 93% of all apps used at one time, because the author passed years ago, it is no longer widely used.

New clients, centered on Internet-based mapping applications, are where the focus is now. I'm currently using PinPoint APRS (featured in *QST* September 2018) by Frank Watervoort, AB0WV. This is a Windows-based app that draws its map sources from the Internet. You can view maps or satellite image data, which helps me orientate where the resources are located.

Other good APRS clients include APRSISCE/32 by Lynn Deffenbaugh, KJ4ERJ, YAAC (Yet Another APRS Client) by Andy Pavlin, KA2DDO, and Xastir for Linux systems (this one is

Figure 8. AvMap GPS

Figure 9. Kenwood D710GA with GPS

great for SAR APRS operations because it handles topographic maps very well). Another one for the Macintosh iOS is PulseModem A, but I have no experience with it. And for us Android smartphone users, there's APRSdroid app available from the Google Play store that can be operated by RF when connected to a radio (like an HT for portability) or RoIP, which is usually how I use it. APRSdroid can also be used on the RFinder B1 smartphone/DMR/Analog radio that's becoming more popular. While pricey, a future model will have full APRS functionality over RF, but for now, it's signals to the APRS-IS only. Confused yet? Keep reading, please.

I've mentioned the APRS-IS several times without explaining what it is and what it does. OK, here's the *Reader's Digest* version: APRS-IS is the Internet collection point for every APRS signal received and iGated from RF to the Internet. It is accomplished by a group of servers around the world, all pointing at each other and sharing it's processed signals. This is what allows you to lookup an APRS station on the Internet using map.findu.com or aprs.fi or aprsdirect.com. If you want to try one, go to http://aprs.fi/k7gps-9 to find the location of my Honda CRV equipped with a Kenwood TM-D710 radio and AvMap G6 GPS or try http://aprsdirect.com/k7gps-6 to see where my Harley Road King with a Byonics tracker or http://map.findu.com/k7gps-10 to see where my portable APRS digipeater with an Icom 2M mobile radio, KPC-3+ TNC and aging Garmin III+ GPS. Go ahead everybody, type those in before reading any further to find where my stuff is!

When I first started using APRS, I was very interested in the emergency

Figure 10. NWAPR Summer Gathering 2019

operations aspect of ham radio and helping get information to the people needing it. While stationed in Texas, I helped develop the tracking of tornadoes along the southwest border of the tornado belt down by San Angelo. We asked Bob Bruninga to come up with a Tornado icon, which he did. We could add a tornado icon to the map on APRSdos and give it a

Figure 11. NWAPRS Summer Gathering 2019 group photo

direction and speed. APRSdos would then transmit that information over the APRS RF to be received by other stations near and far and hopefully, the station located at the EOC.

When I moved (back) to Hawaii, I met a bunch of hams including Robin Liu, AH6CP, who, with their EOC connections, got us a desk in the EOC for the annual Simulated Emergency Test (SET) one weekend. It was an all-virtual experience using resources around Oahu testing communications and sirens for activation. We had a number of simulated emergencies, including a boat fire offshore from Diamond Head and an airplane crashing into Ala Moana Mall, a gasoline truck fire and explosion in Haleiwa (taking out the historic Matsumoto Shave Ice store) and a major power outage on the western shoreline by Nanakuli (like the 1992 Hurricane Iwa did). Seems like we also had emergency services responding to a time-convenient bank robbery in Honolulu, along with lots of rain

and threat of a Tsunami.

Granted it was a lot of activity, but we were there all day long injecting these natural and man-made disasters into the scenario. As each event occurred, I was inputting the data into my APRS client on a laptop, connected to a Kantronics TNC and Radio Shack HTX-202 (going down memory alley here) and out to the APRS network on Oahu.

At the same time, I noticed the EOC Commander as he was bouncing around asking people questions and getting radio updates with his notebooks and assistants trying to keep things sorted out. He eventually landed on my station, which we had connected to a big screen TV showing all of the events on the map and resources responding to them.

For the duration of the SET, the Commander remained there *seeing* what was going on and directing his resources based on what was on the APRS map. It was a coup for us wanting to get APRS into the EOC. I know this has been accomplished around the country and many EOCs have an APRS station with people familiar with operating the various clients.

What else have we used APRS for over the years? Marathon support has been a big user of APRS. I've done these on Oahu, Seattle and Missoula with chase and other support vehicles, First Aid and check point stations all on APRS. We've outfitted bikes, motorbikes and ATVs with trackers, ambulances too so we know where the race resources are. Fun stuff.

High Altitude Balloon (HAB) projects are perfect for APRS projects

Figure 12. NWAPR logo

Figure 13. Author K7GPS at a Summer Gathering

and quite often, you find a balloon icon (SSID -11) floating at 90k feet altitude or higher and chase vehicles on the ground waiting for the payload to return to Earth. Yes, I've left some stuff out.

I want to close this with a plug for all the hams in the NWAPRS group. I've met some good people who've become really good friends over the years. Our common connection has been ham radio and in particular, APRS enthusiasts. I look forward to continuing our Summer Gatherings in September and sharing the fun we have with APRS. Everyone is invited. You just have to show up ready to enjoy a weekend with a great group of ham radio operators with a shared interest - the Automatic Packet Reporting System.

73,

David Dobbins, K7GPS, k7gps.dave@gmail.com.

APRS Resources:

APRS Clients:

APRSISCE/32 for Windows: http://aprsisce.wikidot.com

YAAC (Yet Another APRS Client) for Windows: http://www.ka2ddo.org

PinPoint APRS for Windows: http://www.pinpointaprs.com

Xastir for Linux: http://www.xastir.org

PulseModem A for iOS: http://www.pulsemodem.com

APRSdroid for Android devices: On Google Play at http://play.google.com/store/apps/details?id=org.aprsdroid.app

SARTrack for Windows: http://www.sartrack.co.nz

APRSdos and APRS info: http://www.aprs.org

TNCs and Radios:

Kantronics KPC-3+ KPC-9612 KAM-XL: http://www.kantronics.com

Kenwood TM-D710A D710GA TH-D74A radios: http://www.kenwood.com

Alinco DR-135TP DJ-MD5TGP radios: http://www.alinco.com

Yaesu FTM-300 FT-3DR radios: http://www.yaesu.com

AnyTone AT-D78UV radios: http://www.bridgecomsystems.com

Byonics MicroTrak series: http://www.byonics.com

Argent Tracker2 series radios: http://www.argentdata.com

QRP-Labs LightAPRS trackers: http://www.qrp-labs.com

Tracksoar balloon trackers: http://www.tracksoar.com

AVRT AVT510 tracker: http://www.avrtx.cn

Other Resources:

APRS: http://www.aprs.org

APRS-IS on the Internet: http://www.aprs-is.net

APRS.fi to track any APRS station in the world: http://www.aprs.fi

APRSDirect.com to track any APRS station in the world: http://www.aprsdirect.com

Map.Findu.com to track any APRS station in the world: http://map.findu.com

NWAPRS: http://www.nwaprs.info

Backpacking with APRS: http://www.mthikes.com/backpacking-aprs/

Python APRS Module: http://www.github.com/ampledata/aprs

APRS Hackaday: http://www.hackaday.com/tag/aprs/

APRS Tier-2 Network: http://www.aprs2.net

Microsat Advanced Digipeater/i-Gate: http://www.microsat.com.pl

APRS Packet Reporting Systems: http://www.hamwaves.com/prs/en/

Winlink and APRS interoperability: http://www.winlink.org/

APRSLink APRS on Reddit: http://www.reddit.com/r/APRS/

Probably one of the best sites to learn APRS: http://www.wa8lmf.net/aprs/

Notes:

[1] APRS is a registered trademark of Tucson Amateur Packet Radio Corporation.

Photos by the author.

About the Author

David was first licensed in 1992 while serving with the US Navy in Texas. He became interested in packet and APRS and helped spread awareness of APRS in Texas, then southern Arizona, the San Diego area, Hawaii, and finally in the northwest USA upon his retirement from the Navy in 1996.

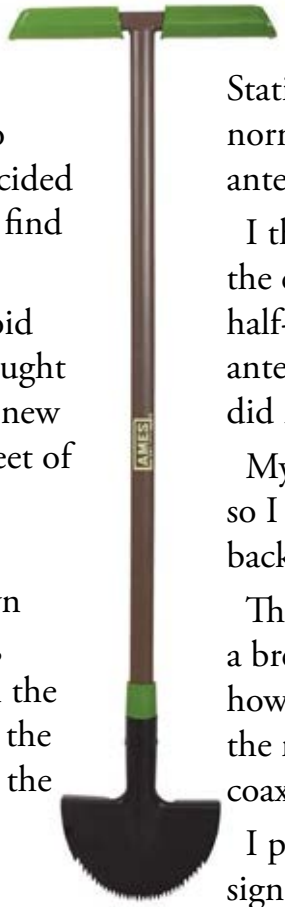
With others he helped develop the Northwest APRS Group, which assists APRS-enthusiasts in Washington, Oregon, Idaho, Montana, British Columbia, Alberta and the Northwest Territories. David maintains the group's website at www.nwaprs.info *and also the NWAPRS mailing list on Google Groups.*

David retired from IT work in 2020 and resides in Cascade, MT near the Missouri River and Interstate 15. He enjoys spending time with his artist-wife Becky, visiting with his grandchildren Owen and Penelope, riding his Harley Davidson motorcycle, flying his R/C airplanes and drones and still fiddles with his N-scale railroad. You can reach the author in Cascade, MT or Oro Valley, AZ via email at ddobbins@gmail.com.

###

LuG (Loop under Ground) Antenna

By Stana Horzepa, WA1LOU



Spring sprang, the lawn beckoned and my mower ate another Loop on Ground (LoG) antenna! That was two springs in a row that I lost a LoG to the mower, so I decided that I would not put down another LoG unless I could find a workaround for my hungry lawn mower.

I decided to bury the antenna just deep enough to avoid the mower, but not too deep as to affect reception. I bought some new coax, heavier gauge enameled copper wire, a new balun and a saw-tooth border edger to slice open 120 feet of lawn.

It took about an hour to slice the lawn and another hour to put down the copper wire generously using lawn staples to keep the wire below ground level. By the way, the stainless steel lawn staples seem to have no effect on the operation of the antenna. Another by the way, I turned the new antenna about 30° counter-clockwise compared to the old LoGs so that its axes now lie 0°/180° and 90°/270°.

After connecting the balun and coax and running the coax up to the shack, I anxiously turned on my ICOM IC-R8600 receiver and I was very disappointed. All signals were weak. There were no signals on frequencies that I normally hear signals and 1600 to 1710 kHz was totally dead. [There is a Department of Transportation Travelers Information Station (DOT TIS) 3 miles away on 1670 that blasts in here normally and there was nothing to hear on 1670 with the new antenna.]

I thought maybe the antenna being sunk in the ground was the cause even though at the most, the antenna was only a half-inch below the surface. So I went out and lifted the whole antenna out of the ground and returned to the radio, but it did not make any difference.

My next guess was that the new balun might be the culprit, so I swapped it for the old balun and 1600 to 1710 kHz came back to life, but all the signals were still weak or non-existent.

That left the coax and the copper wire as culprits. Except for a break in the enameled copper wire, I could not figure out how the wire could be bad. That left the coax, so I replaced the new coax with the old and that solved the problem. Bad coax!

I pushed the copper back down into the ground and the signal levels were exactly the same with the antenna on top of the lawn and with the antenna underground by 1/4 inch to 1/2 inch depth.

Next day, I cut the lawn and the antenna survived and it has survived all the subsequent cuttings this spring and summer.

###

Write Here!

Your *PSR* editor is working on the next issue of *PSR* and hopes to find a few good writers, particularly ham radio operators working on the digital side of our hobby, who would like to write about their activities and have them published here in *PSR*.

You don't have to be Hiram Percy Maxim to contribute to *PSR* and you don't have to use *Microsoft Word* to compose your thoughts.

Your *PSR* editor can handle just about any text and graphic format, so don't be afraid to submit whatever you have to wa1lou@tapr.org --- she can handle it!

The deadline for the next issue of *PSR* is November 1, so write early and write often.

###

On the Net

By Mark Thompson, WB9QZB

Facebook

As you may know, TAPR has a Facebook page, www.facebook.com/TAPRDigitalHam.

However, I also created a TAPR Facebook Group, www.facebook.com/groups/TAPRDigital/.

If you have a Facebook account, "Like" the TAPR Facebook page and join the TAPR Facebook Group.

If you join the group click on the Events link and indicate you're Going to the events.

On Twitter, Too

Access the TAPR Twitter account at www.twitter.com/taprdigital.

Also on YouTube

TAPR now has its own channel on YouTube: the TAPR Digital Videos Channel: www.youtube.com/user/TAPRDigitalVideo.

At this time, there are a slew of videos on our channel including many from the TAPR-ARRL Digital Communications Conference (DCC) that you may view at no cost, so have at it!

###

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TAPR is always interested in receiving information and articles for publication. If you have an idea for an article you would like to see, or you or someone you know is doing something that would interest TAPR, please contact the editor (wa1lou@tapr.org) so that your work can be shared with the Amateur Radio community. If you feel uncomfortable or otherwise unable to write an article yourself, please contact the editor for assistance. Preferred format for articles is plain ASCII text (OpenOffice or *Microsoft Word* is acceptable). Preferred graphic formats are PS/EPS/TIFF (diagrams, black and white photographs), or TIFF/JPEG/GIF (color photographs). Please submit graphics at a minimum of 300 DPI.

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