In the May 2018 Wavelengths, I included a closely cropped picture of Mount St. Helens with a hint that I would have more this month. This isn't the same picture, by the way. Did you know two amateur radio operators died in the 1980 eruption?

Wavelengths

June 2018

President's Message

Hamvention 2018 is now history. I heard quite a number of comments regarding what a great show it was. I hope that you were able to attend and had as much fun as I did.

The XWARN t-shirt sale was very successful. Early reports indicate that we may have surpassed all previous results, but I'll let Janice Crawford and Steve Mackey report on the specifics.

We just concluded the Little Miami Triathlon. I wish to thank all of those who came out to support the event. The next event is not until July. Young's Ice Cream Charity Bike Tour will take place on Saturday, July 14, and Sunday, July 15. This is a big event covering a lot of territory and can use all of the help that is available. Mike Crawford is the coordinator and you can expect to hear from him, soon.

At this month's XWARN meeting, we will discuss the final plans for ARRL Field Day. Field Day is June 23-24. We will again be at Beavercreek Fire Station 61, which is located at 2195 Dayton-Xenia Rd. Beavercreek OH 45434. Setup begins at 9:30 AM on Saturday and tear down will start around 11:00 AM Sunday. Many hands make light work. We will assemble several amateur stations that do not involve established infrastructure or commercial power and see

Xenia Weather Amateur Radio Net
XWARN (W8XRN)

147.1650+ (123.0) (Analog Only)
443.1000+ (123.0) (Analog + System Fusion)

Meetings: 2nd Monday, 7:30PM, Greene Memorial Hospital (1141 N Monroe Dr, Xenia, OH) Herman Menapace Auditorium

how many contacts we can log during the 24 hour operating period. Bands that we might use include 10, 15, 20, 40, and 80 meters. You do not need to be licensed to operate these bands to get on the radio as we will have control operators to assist you. We are not so contest crazy that you won't have an opportunity to learn how to do it. Even if you would rather not talk on the radio, you may find it to be fun to enter contacts in the computerized log and to do "dupe" checking.

Even if you do not wish to operate radios or log contacts, consider joining us for a picnic supper on Saturday evening. Plan to arrive by 5:30 as we expect to begin the meal at 6:00. Bring a chair for each person and a dish to share. Friends and family are welcome provided that they either have an interest in amateur radio or are at least tolerant of a bunch of crazy folks who talk in cryptic tongues where "this is whiskey eight bravo India, three alpha, Ohio" has meaning of some sort. And, don't forget to bring a chair.

73 de N8ADO

Know Your APRS Settings and Beaconing Modes

Editor's Note: Names have been left out to protect the guilty.

At the 39th Annual Morgans Little Miami Triathlon, we noticed that the location of one of the amateur radio volunteers was not updating in APRS. Net control asked the station to manually force a beacon. Shortly thereafter, the operator realized that they were in *Smart Beaconing* mode and were driving too slow.

What is *Smart Beaconing*? Early APRS modes consisted only of manual and fixed rate beaconing. As APRS gained in popularity, APRS started becoming more and more swamped, and packets had difficulty in getting through.   To combat this, Tony Arnerich KD7TA and Steve Bragg KA9MVA invented *Smart Beaconing*. *Smart Beaconing* is just like it sounds—only transmit an APRS when it makes sense to do so.

What makes sense? If you're stopped, you don't need to beacon. You don't need to beacon frequently when moving slow only when moving fast. If you're moving in a straight line, you probably don't need to beacon as often as when turning or veering. And, to be on the safe side, smart beaconing will force a beacon after a set period of time if none of the other conditions are met.

So what was the problem at Morgan's?   There's a threshold speed for defining stopped vs moving, and that speed was set too high. Many radios default to a speed suitable for cars. If you're walking, biking, or otherwise moving at a crawl—e.g. a car tailing a slow bicycle — that speed needs to be lowered appropriately.

To be honest, my experience as a bike mobile operator is that it's simpler and often better to change my beaconing mode to fixed intervals of 2 or 3 minutes when supporting an event. *Smart Beaconing* is great when traveling from Point A to Point B. But, during events, net control likes to see regular position updates, and fixed interval beaconing lets observers visualize the pace on a map.

Jason (WG8B)

The 1st and last station bikers pass through on the bicycle portion of Morgans Little Miami Triathlon.
Ohio 350 and Middleboro Rd.

Minutes: May 14, 2018

Meeting was opened by Bob at 1932

Cracker Barrel — Variacs might be available from Bob and at flea market at Hamvention

Motion to accept minutes from April. Janice and Jim motion. 2 opposed. Motion passed. Motion to accept treasurers report. Richard, Jim motioned. Motion passed unanimously.

Committee Reports

Public Service. Founder's Run. Cancelled 10k had plenty of ham help. Morgan's. Need help. Abe Kahn. Aug 18-19, need someone to organize for the 18th.

Trailer. Work crew on last Saturday. Phil, Chris, Bob, Andy, Rick, Dave Crawford, Mike Crawford. Cleaned and looking good. UPS has new battery and new fan and it's fully functional. Ready for Hamvention.

Repeaters. Chat with Dave Reeves. Tower won't support new weight per current code. Agreement from insurance company to grandfather in. Means second site might be operational soon. Having problem with a board but will hope to find one at Hamvention.

Membership. 6 new members. 43 total member including 9 life members.

Facebook. Liz took over Facebook. If you haven't liked the FB page, do so. More exposure. Mark that you're attending.

Mesh. Starting to be interesting things on the area mesh network. Some have VOIP phones.

Old Business

T-shirt sales for Hamvention. Sign up sheet going around.

New Business

Discussion on changing newsletter requirement of being out 10 days before written vote to electronic means or by reducing number of days. Newsletter editor has difficulty getting a complete newsletter out that early, especially for those that only receive the print version via snail mail. Discussion was shelved as no motion was being asked for by the editor at the present time.

Motion to adjourn. Motion approved @ 2013

Jason Bowman, WG8B

Secretary

XWARN Mission

The mission of the Xenia Weather Amateur Radio Net (XWARN) amateur radio club is to conduct weather spotting nets during severe weather and other communication services for the City Of Xenia and all other Greene County communities.

In this capacity, we are set up to provide communication services as required to the Greene County Ohio Public Service Agencies and other local government entities. The communications services provided to the supported agencies may be for emergency purposes or to simply enhance their communications abilities. On an as needed basis XWARN provides similar services to various government entities of our surrounding counties.

Additionally, XWARN provides communications support to various community organizations in support of marathons, 5K runs, 10K runs, bicycle events, etc. to provide health and safety assistance to the participants and sponsors of said events.

In support of these goals, XWARN operates and maintains amateur radio repeaters and other equipment in Greene County.

Amateur Radio in Support of Mt. St. Helens

On May 18, 1980, Mount St. Helens erupted in Washington State after having spent the prior two (2) months reawakening. I was only 8 years old at the time. Approximately 57 people died during the 1980 eruption. Perhaps the most well publicized death was that of geologist David Johnston. But did you know that two amateur radio operators were also killed? Did you know that amateur radio operators were involved in helping set up remote sensing capabilities both before and after the blast?

cameras set up around Mount St. Helens to be operated by remote control. While commercial equipment was available, it could not support the distances involved with mountain scales.

TERAC modified pocket pagers for the job and used a 35W, 450MHz transmitter. Over 300 man-hours were required to complete the task of constructing the encoder and decoders and preparing the batteries, antennas, and other equipment. Roger McCoy, W7DAV, Tom Hill, WB7FHF, were the principles

While any death is tragic, the death of David Johnston (http://bit.ly/2LnmFCA) (above) was tragic in a classic literature sense as well. David Johnston wasn't even supposed to be near the mountain the day it erupted. He was filling in for a colleague. But David Johnston was also in the very small group of scientists who were very concerned about a lateral (sideways) blast instead of a classic vertical eruption. He was so concerned that he made public statements without clear authorization to do so. But, when he went out that last time to what is now known as Johnston's Ridge (supposedly safe assuming a vertical eruption), Mount St. Helens had been quiet for a few days. It did not appear an eruption was imminent.

About a month prior, the National Geographic Society and US Geological Survey asked the Tektronix Employees Radio Amateur Club (TERAC) to provide equipment that would allow

in the effort, and they were flown out by helicopter on May 7, 1980, to install the equipment. Both Roger and Tom are assumed to be silent keys (SK) because Roger's call sign now belongs to someone in TX, and Tom's call sign isn't even listed in ULS. This occurred in 1980 after all, almost 40 years ago.

The remote control station was to be operated by Reid Blackburn (http://bit.ly/2LYJ0aD), KA7AMF, at Coldwater 1 about 8 miles northwest of the mountain. Interestingly enough, Reid was on a leave of absence as a photographer with *The Columbian* newspaper in support of the USGS and National Geographic missions. Reid was not there in an official capacity as an amateur radio operator, however. Reid was supposed to be off the mountain by May 17, one day before the blast, but agreed to stay longer.

At 0832, a magnitude 5.1 earthquake occurred, and about 10

seconds later the whole north face of Mount St. Helens collapsed in a landslide. While David Johnston had predicted a lateral eruption, even he didn't imagine the whole north flank would collapse. If he had, he probably wouldn't have agreed to be on that mountain in the location he was assigned. The sudden collapse caused the gases in the magma to rapidly come out of solution resulting in the blast we saw.

The pyroclastic flow and landslide would have taken less than a minute to reach Johnston, but Johnston attempted to get a

up … Coming up over the ridge towards me … I'm gonna back outta here … Gentlemen, the, uh, camper and car sitting over to the south of me is covered … And it's gonna get me too … We can't get out of here.

The full audio is available here (http://bit.ly/2sNeWGn).

The car and camper he was referring to was Johnston's USGS camper seen in the phot on the previous page. The camper would eventually be found in 1993 during construction of a road leading to what is now Johnston's Observatory. Nei-

radio message to his colleagues in Vancouver: "*Vancouver! Vancouver! This is it!*". His colleagues never received the message. We only know it was sent because amateur radio operators were monitoring the frequency.

There was another amateur radio operator on the mountain that day about 2 miles further away than Johnston. His name was Gerry Martin, W6TQF. Gerry was acting in a RACES capacity supporting the Washington Department of Emergency Services.

Now we've got an eruption down here. Now we got a big slide coming off … The slide is coming off the west slope … Now we got a whole great big, uh eruption out of the crater … And we got another opened up on the west side … The whole west side … northwest side is sliding down … The whole northwest section, uh north section is blowing

ther Johnston's nor Gerry's bodies were ever found.

Reid's car, shown above, was seen shortly after the blast under several feet of ash and debris, but conditions precluded rescue for a few days. When rescuers finally arrived, they found Reid's body in the vehicle. A fellow photographer dug his camera out about a week later, but the film was ruined from the heat from the pyroclastic flows. However, in December 2013, an undeveloped roll of film of pre-eruption shots was discovered in the archives at *The Columbian* and subsequently published.

But Gerry wasn't the only amateur involved in monitoring and conducting science on the mountain. When the mountain first awoke on March 27, 1980, ARES and RACES nets

5

Amateur Radio in Support of Mt. St. Helens

A personal picture taken by Jason Bowman, WG8B, at Mount St. Helens along the Abraham Trail in 2001.

were established on VHF and HF feeding information to the Washington Department of Emergency Services continuously for days until the mountain settled back down in early April.

After Gerry had been lost in the immediate blast on May 18, amateur radio operators began relaying wind and ash fall information as the main blast cloud started moving east.

Amateur radio was there when Mount St Helens erupted again about a week later in late May. In addition to the existing amateur radio support, a geologist with Portland State University, Dr. Leonard Palmer, N7AQA, (also likely an SK as there is no reference to that call sign in ULS) was instrumental in evaluating the effectiveness of amateur radio in the vicinity of the mountain—

he was carrying a 2m handheld radio in a plane above the action.

A 3rd eruption occurred a few weeks later in mid-June.

Six months after the May 18th eruption, amateur radio was still providing support to the monitoring and scientific efforts. The Forest Service required science and monitoring teams to have a radio operator with them and be in radio contact with a telephone-equipped base station at all times in case an evacuation was ordered. Amateur radio operators provided all of the necessary radio support.

At the end of it all, it was estimated that over 300 amateur radio operators participated and somewhere between 2000 and 3000 messages were passed in support of Mount St Helens emergency operators and science.

By the way, there is an incredible video (http://bit.ly/2J99RmF) available of the eruption made from still shots with minimal digital editing. These shots are only available because a quirk of local topography prevented the photographer from being killed by the blast.

If you're curious where some of this information came from other than the sources already listed, most of it came from articles in QST from July, August, and November of 1980. If you are a member of ARRL, you can access the articles through the ARRL website.

Jason, WG8B

LimeSDR and LoRa

Google threw another recommended page at me the other day for the LimeSDR (http://bit.ly/2kLPTj0) and LimeSDR Mini. What is LimeSDR? It's a software defined radio for experimentation. It only puts out 10dBm (0.01W), so for any serious use you'll have to use an amplifier. LimeSDR supports up to 4x4 MIMO but uses MMCX connectors (I think) and costs about $300. Realizing that the cost was probably too high for some and MMCX connectors can be a pain to work with, the creators are coming out with the LimeSDR Mini (http://bit.ly/2LTaa2J). The Mini will be about $139, will only support 2x2 MIMO, and will have SMA connectors instead.
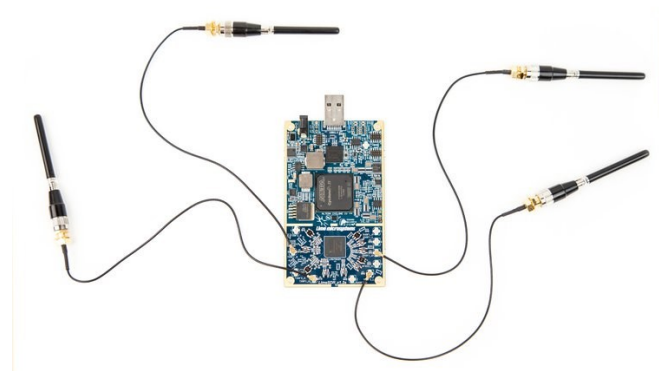
To use an SDR radio, you of course need software. So I started checking out GNU Radio. After a few minutes, I stumbled onto a project page (http://bit.ly/2sHnrCt) for LimeSDR.

And, on that page, I discovered a project involving the LoRa (Long Range) waveform. Over the Winter, I shared an experiment I was conducting with Beartooth radios, which happen to use a LoRa chipset. The Beartooth pairs with your smart phone or other Bluetooth device and allows you to send text messages, limited voice, and share position data without a cellular network.

LoRa was conceptualized to support the Internet of Things (IoT). This essentially means remote, battery powered sensors. So think of lots of things sending information over radio at the same time that need to last in the field for 2 years.

LoRa is an interesting waveform. It uses lower power — about 1W here in the US and maybe 0.25W in Europe — to conserve battery power and meet regulatory requirements. To overcome the lower power limitations, it uses a spread spectrum technique, specifically chirp spread spectrum (CSS), with a low bit rate.

How low? The really long range stuff moves at about 290bps! That's about 36 ASCII characters per second and less with forward error correction (FEC). Not very fast at all. Closer in, LoRa will support about 5kbps or 625 ASCII characters per second less FEC. If curious about the physics, look up Shannon's Limit or the Shannon-Hartley Theorem. Basically, lower bit rates will allow for lower signal-to-noise ratios, i.e. more range.

Chirp is exactly what it sounds like. LoRa typically occupies 125kHz of bandwidth but can be as high as 500Mhz. The LoRa waveforms sweeps from low to high frequency across the bandwidth, which sounds like the chirp a bird would make.

I can't argue why CSS is better or not than say Direct Sequence Spread Spectrum (DSSS). But all spread spectrum techniques use a spreading function at the receiver and a *despreading* function at the receiver. An interesting thing occurs in the receiver. While the despreading function does exactly what it says for the signal, any noise added to the signal after transmission is effectively spread out by the despreading function in the receiver resulting in processing gain. Weird, huh? What does it yield exactly? LoRa in its long range mode can decode signals 20dB *below* the noise floor. As a point of reference, good WiFi signals are about 20dB *above* the noise floor!

I personally see LoRa as a potential APRS replacement (APRS can pass text messages, but radios make it difficult to use this functionality) or a way to pass form data to support served agencies at the tactical edge. But replacing APRS outright is not likely to occur. The reason LoRa might make some inroads is that the commercial chipsets operate in the ISM bands where encryption is allowed. But a cheap SDR chipset running in the UHF amateur bands (have to run spread spectrum above 220MHz) with 5W would have a much bigger simplex reach than APRS down in VHF, and you would need a lot of LoRa nodes before packet collisions became a problem. With APRS, all is takes is a few weather stations and hams running to the supermarket with APRS on to bring APRS to its knees.

My goal would be to have more information and maybe even some experiments to share sometime in the near future. In the mean time, I found an interesting video (http://bit.ly/2HiBp3a) that explains the basics of LoRa better than I can.

Jason, WG8B

Dayton Gastroenterology, Inc.

Belinda Poe, BS
Marketing Manager
bpoe@daytongastro.com

75 Sylvania Drive, Beavercreek, OH 45440
ph (937) 320-5050 x1021 | c (937) 683-6532

www.daytongastro.com

Bob, & Team,

Thank you for supporting the no Buts About It event.

Belinda

BEAVERCREEK TOWNSHIP
FIRE DEPARTMENT
www.beavercreekfire.org

851 Orchard Lane, Ste A Beavercreek, Ohio 45434-7228
p.937.426.1213 f. 937.426.8780

November 4, 2017

XWARN
PO Box 562
Xenia, OH 45385

To Whom It Concerns:

On behalf of the Beavercreek Township Fire Department, I would like to thank you for displaying your XWARN trailer at our Fire Prevention Week Open House on Saturday, October 14, 2017. We appreciate your commitment and dedication to community events such as our Open Houses.

Again, we thank you for your participation.

Sincerely,

David VandenBos, Fire Chief
Beavercreek Township Fire Department

XWARN
P.O. Box 562
Xenia, Ohio 45385

Email: info@xwarn.net
Website: XWARN.NET

«FNAME» «LNAME» - «CALL»
«ADDRESS»
«CITY», «STATE» «ZIP»

Wavelengths

Wavelengths is published monthly by the Xenia Weather Amateur Radio Net. Our meetings are currently held on the 2nd Monday of each month at **7:30 pm** at the Greene Memorial Hospital Auditorium. You can find additional information about our organization at www.xwarn.net . We welcome new and experienced Amateur operators and those interest in becoming an Amateur operator to attend our meetings.