



Students and mentors from [Vault 6936](http://bit.ly/2F2yzl6), a Beavercreek and Bellbrook FIRST Robotics community team that we sponsor, work on their robot in between matches at the Miami Valley Regional competition March 7-9. They were ranked as high as 5/61 early on but finished 41/60. The next competition is the Buckeye Regional at Cleveland March 28-30.

# Wavelengths

## Xenia Weather Amateur Radio Net XWARN (W8XRN)

March 2019

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

## Program for March 2019

Ron Cramer Hamvention General Chair for 2017 and 2018 will speak about some of what has to happen to put on the big show.

## President's Message

*Editor's Note: Either Liz did not see my reminder or decided it was way too late (my fault) to get a President's Message out for this month.*

## Club Contacts

- Liz Kline, KE8FMJ  
[President@xwarn.net](mailto:President@xwarn.net)
- Vice President, Bob Baker, N8ADO  
[Vicepresident@xwarn.net](mailto:Vicepresident@xwarn.net)
- Secretary, Jason Bowman  
[secretary@xwarn.net](mailto:secretary@xwarn.net)
- Treasurer, Steve Mackey, N8ILR  
[Treasurer@xwarn.net](mailto:Treasurer@xwarn.net)
- Repeater Guru, Jim Simpson, WB8QZZ  
[Technical@xwarn.net](mailto:Technical@xwarn.net)
- Web Master Josh Long, W8KDL  
[webpresence@xwarn.net](mailto:webpresence@xwarn.net)
- Membership, Phil Verret, KA8ZKR  
[membership@xwarn.net](mailto:membership@xwarn.net)
- XWARN Trailer / Public Service,  
Mike Crawford, KC8GLE  
[trailer@xwarn.net](mailto:trailer@xwarn.net) or  
[publicservice@xwarn.net](mailto:publicservice@xwarn.net)
- Newsletter, Jason Bowman, WG8B  
[newsletter@xwarn.net](mailto:newsletter@xwarn.net)

## Minutes: Feb 11, 2019

Meeting was opened by Liz at 1930. 16 Members and 2 Guests present.

Motion to accept the January Minutes made by Dick and Janese. Passed. 1 opposed.

### Cracker Barrel

Jason (WG8B) asked about hearing the German Twp Fire Department on one of the MURS frequencies.

### Committee Reports

*Membership.* 9 Life, 28 paid, 37 total.

*Treasurer's Report.* Richard, Richard, Janese. 1 opposed. Motion passes. Treasurer's Report is available to Members from the Secretary or Treasurer upon request.

*Public Service.* Too cold for anything to report. No Butts About It, 5K, March Saturday 23rd. Tech Fest volunteers and mentors for radio kit building.

*Trailer.* Too cold. Not touched.

*Repeater.* Bret and Jim not here. New DMR repeater in Greene County.

*Website.* Josh not here. My name and secretary email are not working correctly.

Facebook. A little slow getting information out there.

Newsletter. A little light lately for the same reason Facebook has been a little slow.

Mesh. Undergone some management changes. Shift in focus from emcomm to having a working managed network. Get things working then figure out how to connect in for emcomm purposes. Nothing will probably happen for a few months then we'll see.

### Old Business

Mesh invoice finally came in.

### New Business

No new business except Liz needs to talk louder.

### Presentation

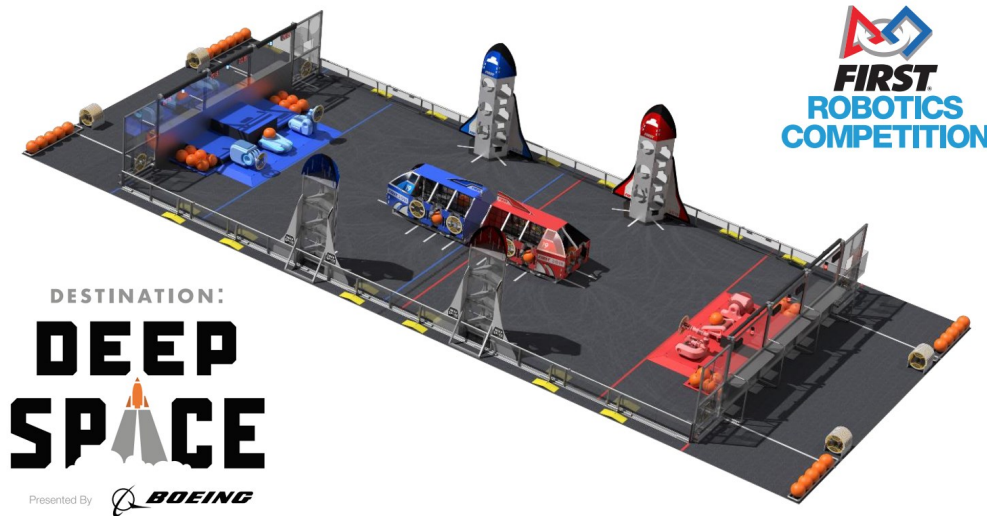
John Westerkamp (W8LRJ) gave a presentation on DMR and the new DMR repeater for Greene County ARES use.

Next meeting Mar 11, 2019. Motion to adjourn. Meeting ended 2032.

Jason Bowman

Secretary, XWARN

## Destination: DEEP SPACE



This is the second year that XWARN has sponsored the Vault robotics team in Beavercreek. Vault is a community team not associated with the Beavercreek school district. This is Vault's 2nd year in existence and the first year with students from outside the Beavercreek school district — the team now includes students from Bellbrook.

Vault is part of FIRST robotics. Most people will recognize the name “Lego League”. Well, this is the first step in FIRST and is geared towards grade schoolers. The second step is the “First Technical Challenge” or FTC and is geared towards middle schoolers. Vault is part of the FIRST Robotics Challenge or FRC and is geared towards high school students.

Vault is housed in a facility in Russ Research Center that now includes a mix of Lego League, FTC, and FRC teams. The facility is rented to the teams by Ohio University for some token amount each month.

The competition season for FRC runs from early January when that season's competition is announced through late April when the national-level competitions occur in Houston and Detroit. The off season is used for recruiting, fund raising, and learning and perfecting skills used to design, manufacture, and test the robots.

Matches occur in a 3-on-3 format with Red and Blue Alliances and last 2 minutes 30 seconds. It usually isn't feasible for one robot to do everything well, so teams will scout other teams and try to team with other robots that complement theirs.

This year's competition is called “[Destination: DEEP SPACE](http://bit.ly/2Ut8CA9)” (<http://bit.ly/2Ut8CA9>). There are three types of field pieces — habitat, cargo ship, space ship — two types of game pieces — hatches and cargo (balls) — and two modes of operations — televisual and direct line-of-sight. To put it simply, the cargo ship and rocket are composed of bins whose front face must be sealed with a hatch in order to hold cargo (balls) dropped in from the top. Robots start and stop in the habitat, which is a multilevel platform design to test a robot's ability to climb. For the first 15 seconds, a set of blinds blocks direct visual sight of the robots from the control stations, and operators must use video from a camera mounted on the robot to navigate the playing fields and manipulate game pieces.

*(Continued on page 5)*

### 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.



## German Township Fire Department on MURS?

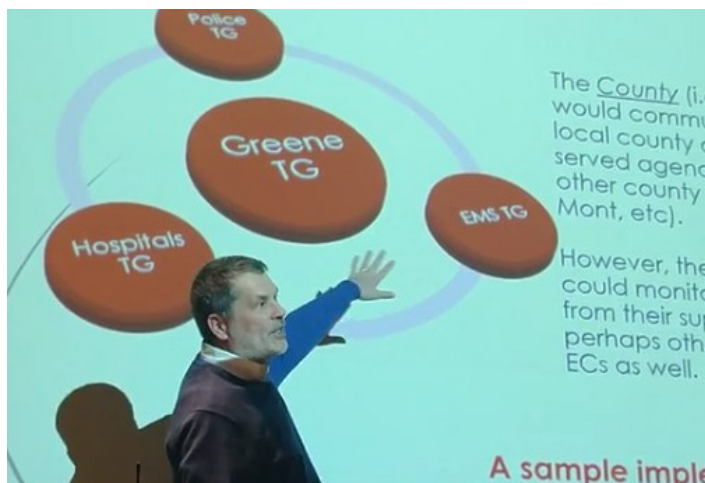
During Cracker Barrel at the February meeting, I asked about hearing the German Twp Fire Dept on MURS channel 2 (151.880 MHz ). Multi-Use Radio Service or MURS is a license-by-rule radio service (basically no license required) that is composed of some of the old business band frequencies.

I was scanning the MURS channels trying to determine the lay of the land in my area, basically who's using MURS and for what, so that I could do some experiments relatively interference free for everyone. Over a 3 day period, I heard both personal and business voice, some digital (garage door openers, driveway monitors, etc), and the German Twp Fire Dept.

I was surprised to hear an emergency service, and my question during Cracker Barrel was whether the Fire and EMS was ever licensed in those frequencies as I thought that spectrum was slightly higher in the mid to high 150MHz range. Some of the older hams in the room assured me that they are using frequencies they've probably had for a very long time now. I knew business users were grandfathered in but didn't know Fire and EMS was ever there.

One of my main concerns was interfering with German Twp Fire. But after the meeting, I realized my concerns weren't valid if I was operating on MURS like I should. What I mean is, MURS only allows for simplex operations (no repeaters, no store-and-forward), limits power to 2W (no limit on gain), and limits antenna height. The reason I can hear German Twp Fire and EMS is probably that they are using a repeater whose output is on MURS channel two. Even if I transmit with 50W, there's no way I'm going to interfere with emergency vehicle reception over in German Twp from Bellbrook. Now, if I were to determine the repeater input frequency (probably a 600KHz offset), I could easily interfere with that and get into a whole bunch of trouble. If I lived in German Twp, my guess is that I would have to give up using MURS channel 2 because you never know when German Twp Fire would be using it, and they are considered the primary users of that frequency according to Part 95.

## John Westerkamp on DMR in Greene County



John Westerkamp, W8LRJ, gave a presentation on DMR and the new DMR repeater in Greene County. I will have the video of the presentation up on YouTube within the next month. For the time being, just note that there is a complex talk group structure in place designed to properly segregate emcomm communications into local, county, and state operations as well as by function.

I can't remember the exact question — it will be clear once the video is up — but there was a question about bandwidth available on DMR. Basic DMR uses a 12.5KHz wide channel divided into two 6.25KHz time slots. The DMR vocoder (voice encoder) supports from 2kbps up to 9kbps. The DMR waveform is basically C4FM (think Yaesu Fusion), which uses 4-FSK with a theoretical data rate up 9.6kbps. So don't expect much data even if that's possible through DMR.

But what about voice? DMR uses Digital Voice System's AMBE+2™ vocoder supporting 2-9 kbps streams. To make this possible, the first step is to use an analog low pass filter to strip out frequencies higher than 3kHz (the upper limit of the average speaking voice). Then the AMBE+2 vocoder does what all vocoders basically do — sample at the Nyquist frequency ( $2 \times 3\text{kHz} = 6\text{kHz}$ ), and, knowing how humans perceive sounds, it smartly throws some bits away. Bit rates above 6kbps are easily explained by the need to include forward error correction (FEC) and that the C4FM waveform can encode 4 bits per cycle.

## Destination: DEEP SPACE



*Just a random shot of the actual DEEP SPACE playing field at Nutter Center.*



*Lt Gen Bunch talks to the students of Vault 6936*

Videos for some of Vault's matches. For some reason, not all matches have been published to YouTube yet.

Match 7:

Match 16:

Match 24: <http://bit.ly/2ColJvN>

Match 37: <http://bit.ly/2HrjEm4>

Match 48:

Match 58:

Match 63:

Match 74:

Match 86:

*(Continued from page 3)*

Robots are controlled via driver stations usually composed of two sets of controls, two operators, and a “mission manager”. The first set of controls manages the drive and steering mechanism on the robot base. The second set of controls manages the payload mechanisms — articulated arms, grabbers, suction devices, etc. Xbox controllers and joysticks are the most common types of controls. The third person does not directly manipulate the robot rather observes what’s happening on the field and directs the two operators accordingly. This is very similar to how tank crews operate!

Controls and robot status are managed through standard driver station software required by FIRST, and communication is via either an Ethernet cable directly to the robot (practice, testing, etc) or via an Open Mesh router (actual matches). This standardization ensures there is no RF interference on the competition field, ensures game officials can disable robots for any reason, and provides a common infrastructure for ease in troubleshooting technical issues. The Open Mesh router is a standard WiFi device that apparently specializes in connecting many nodes in close proximity to each other, which basically describes a typical match. Sometimes there is a wide gulf between theory and reality :-)

This year’s Miami Valley Regional competition at Nutter Center seems to have had more military brass than last year. Lt Gen Bunch gave the keynote address. He is the Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition. He was also seen roaming the pit areas on the arena floor talking with the students including our sponsored team, Vault 6936.

That’s it for now. I will let you know how Vault 6936 does at the Buckeye Regional in Cleveland in April’s newsletter.

Club Call: W8XRN

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XWARN  
P.O. Box 562  
Xenia, Ohio 45385

Email: [info@xwarn.net](mailto:info@xwarn.net)  
Website: XWARN.NET

«FNAME» «LNAME» - «CALL»  
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## **Wavelengths**

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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](http://www.xwarn.net). We welcome new and experienced Amateur operators and those interest in becoming an Amateur operator to attend our meetings.

