WavViewDX

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As DXers, one of the most difficult challenges that most of us face when listening is to identify what we're listening to. For years guides such as the World Radio TV Handbook and many other frequency guides have helped us to join the dots between what we think we might be listening to and what is actually on the frequency, but the advent of software defined radios (SDRs) have completely revolutionised the possibilities of hunting for DX treasure. Being able to record not only the audio of a period of broadcasting but the actual spectrum itself brought a leap forward in DXing potential, and this spurred on talented software engineers to take these new possibilities to incredible new levels. Jaguar - the excellent software that integrates with the Perseus SDR - changed the MW DX world entirely giving DXers a view of a frequency at carrier level not seen before. Now, WavViewDX brings detailed carrier views to users of most SDRs.

WavViewDX is the brainchild of German DXer Reinhard Weiß. Reinhard's interest in radio started as a teenager in the 1980s where MW and SW bands packed with broadcasters ignited a spark of interest that would go on for decades to come. "It was equally fascinating and scary," explains Reinhard, and over the years to come his interest would grow. A few years later he would start to build his computer programming skills, developing his own morse code decoder and a host of frequency database and logging programs. As the years passed his interest grew and, fast forwarding to 2012, Reinhard first entered the world of SDRs first with a FUNcube Dongle Pro+ and then soon thereafter, a Perseus SDR. And with that, and a few more years of casual listening, the world of MW DXing opened up.
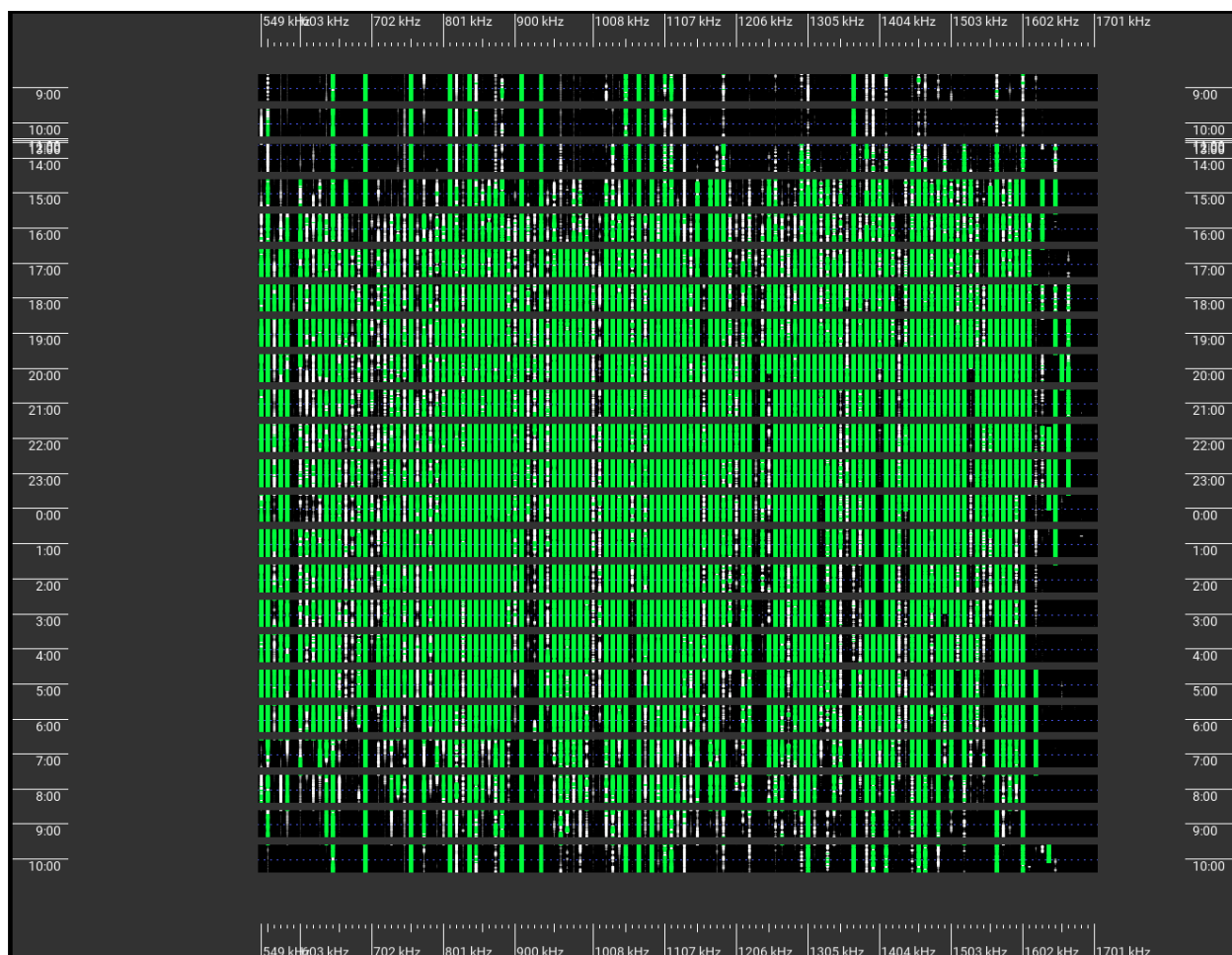
"It was really tough!" recalls Reinhard, and although the first few successes came with the usual east coast suspects that many DXers first log, he found the process of searching through recordings to be difficult and time consuming. "I needed something that would point me to the right frequencies and times so that I could reduce the browsing time with the Perseus software to a minimum, so I set up a Python project that would read and analyse the Perseus recordings and produce a picture with the desired information."

This visual guide would go on to become the first idea of what his software would become, but whilst having visual analysis was a help, Reinhard still found the process to be unsatisfactory. "The problem was that deriving the frequency and time of the interesting spots in the analysis was hard to perform on-screen and usually required a ruler and several fingers. I needed something better and thought of programming a viewer which would show frequency and time of any clicked location."

And so the work continued. Reinhard came up with the idea of incorporating a player add-on to his IQ file viewer, giving him the ability to not only visualise the carriers from his recordings, but to click on them and instantly play back the recorded audio on the given frequency. He gave the software to a few friends to try out, and with their feedback things gathered pace and, in 2023, WavViewDX was born.
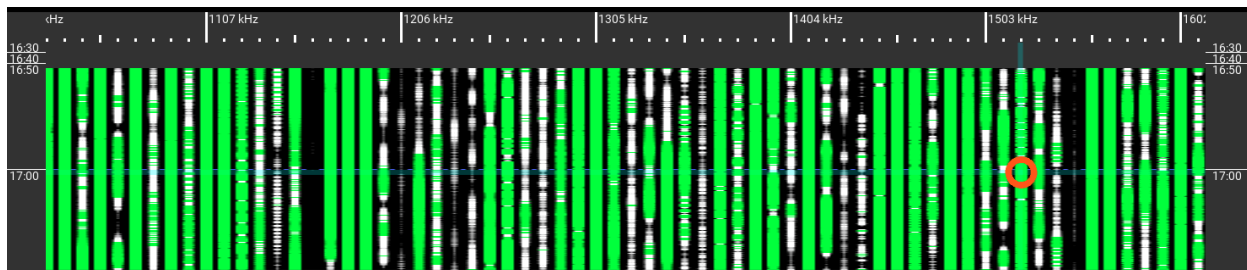
Since then WavViewDX has slowly built up a loyal following of DXers around the world thanks to the word about the software gradually getting out. With so many DXers using SDRs and recording large segments of bandwidth for elongated periods of time, WavViewDX has become an essential tool for many in analysing recordings to help spot the elusive DX across the band. Let's take a look at the software and what it can do, and I'll use how I use WavViewDX to help to illustrate things.

Every day I set my SDR - an SDRPlay RSPdx-r2 - to record 5 minutes either side of the top of the hour, across the full MW band. The recording isn't audio though, it is what's known as an IQ file. This is in effect a full capture of everything the SDR was receiving at that time, across the band, allowing me to replay the recordings later as if I was listening live. The following day I then import all of the day's recordings into WavViewDX into a single file that spans top of hour recordings from 1400 all the way to 1000 the next morning. Here's what it looks like:
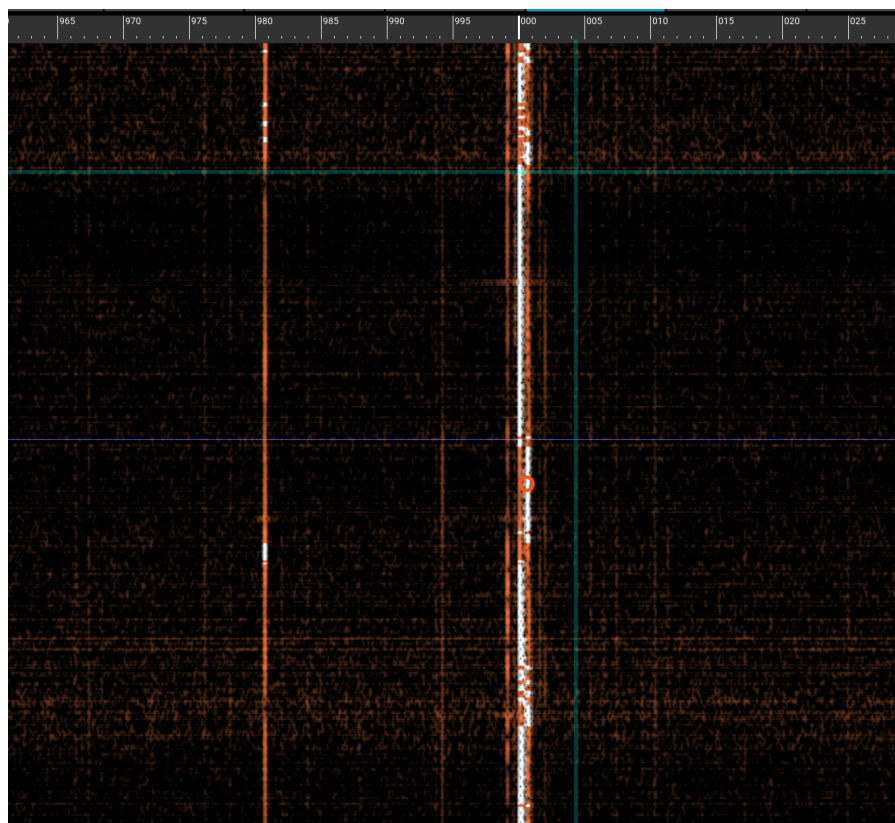

Across the top of the screen you can see the frequency, and along the side there's the time. The white and green lines show carriers on each frequency. Where it's white it's a weak carrier, and where it's green it is stronger. Looking at the earlier hours, around 1400 and 1500, it is clear to see that I was only really receiving the stronger daytime signals, but look how the picture changes at 1500 as darkness starts to approach. (This was written in late November, where sunset at this location is around 1645).

Let's look at one top of the hour segment in more detail, from 1650 to 1710, at the top end of the band:

Now you can more clearly see where there is some activity. On some frequencies such as 1206kHz it appears that there's not a lot recorded on the face of it, and others like 1449kHz look to have a strong signal, or signals, recorded.
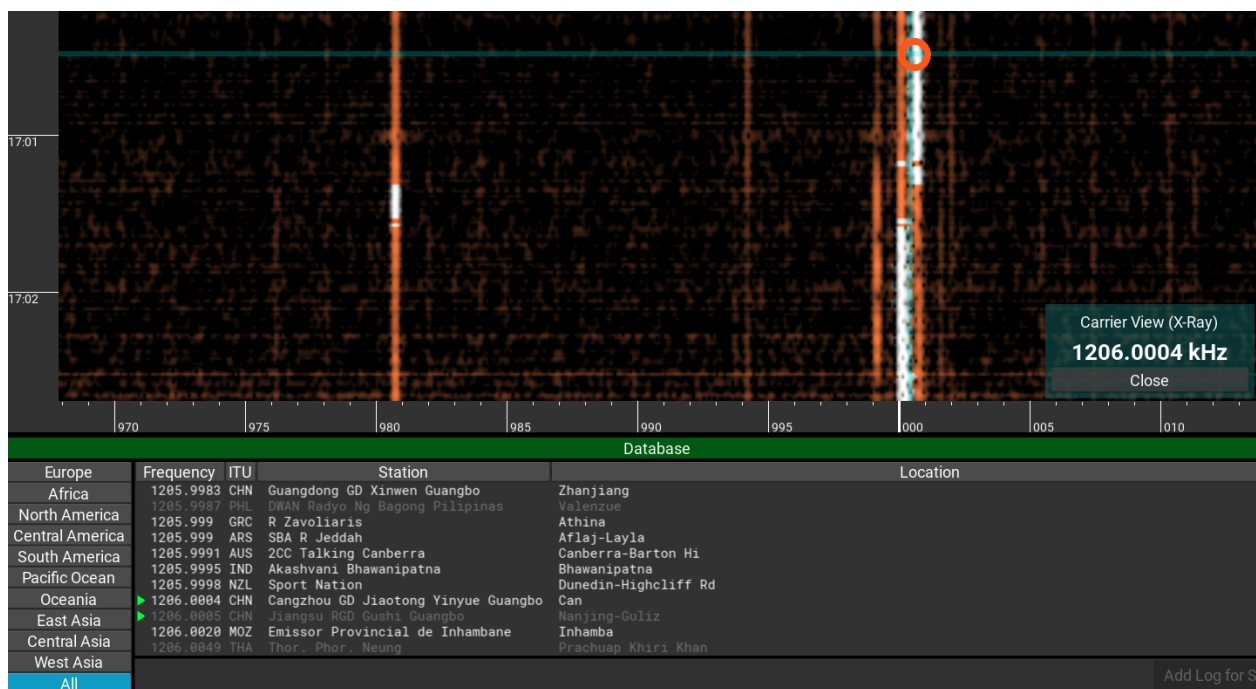
Clicking on the green bars starts an audio player at the time and frequency shown. You can see the small orange circle on the last image which is where I clicked, playing 1521kHz at 1700, and when I did this I was able to listen to 1521kHz just as if I was listening live. This in itself is fascinating, the visual view of the band really helping you to build up a picture of what is where, and where you might want to start to hunt for DX. Going back to 1206kHz, we'd previously supposed that there probably wasn't much received at this time, but this is where WavViewDX really gets going. Right-clicking on a signal gives you the option to enable High Resolution Carrier View, and this is what we can now see on 1206kHz:

Now across the top of the screen the units are Hz. 000 in the middle represents exactly 1206kHz, then either side of that is the offset in Hz from the centre frequency. So now we can see that there are actually 5 or 6 carriers on the frequency, far beyond our initial thought that we'd find an empty piece of band there.
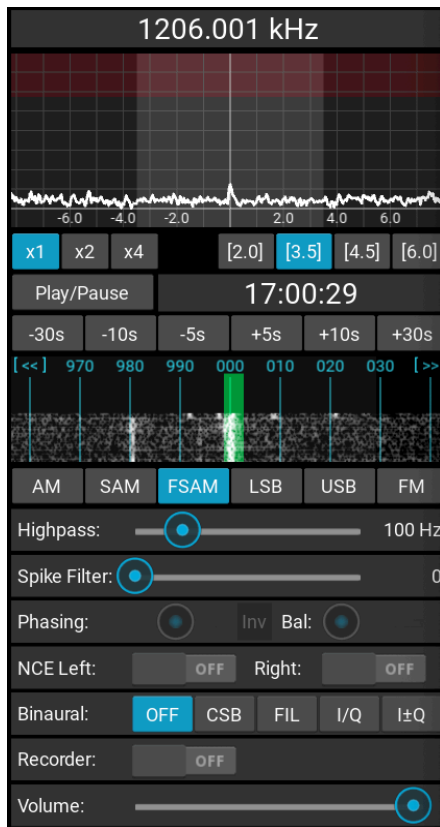
And this is where WavViewDX gets even more interesting. MWList is well known within the MW DX community as one of the most comprehensive frequency guides of MW broadcasters around the world, but it doesn't only list stations on a frequency to a kHz level. It also includes detail (where available) up to a 1Hz resolution of each station's carrier frequency. These carrier frequencies are contributed by DXers around the world who use a GPS receiver to lock their SDRs to a very sharp degree of accuracy, meaning that they can confidently state that a station is on, say, 1206.962kHz. WavViewDX, in turn, is integrated into the MWList database, meaning that for any given frequency the user can see what stations are potentially present, and their respective carrier frequencies.

So coming back to our 1206kHz example, we can now click on each of the carriers and see their accurate carrier frequency, and for each of these we can see an instantaneous lookup of potential stations we could be receiving. (Note - there is an assumption here that your own SDR used to make the recording is accurately calibrated to be precisely on frequency. In my case I use a simple Leo Bodnar GPS receiver to accurately frequency lock my SDRPlay SDR). To illustrate this I've clicked on the strongest carrier in our example, the white carrier on the right:

Now at the bottom of the screen you can see a number of stations on 1206kHz, and a small green arrow indicating a match between the carrier that I've clicked on, and stations known to be on that precise frequency. In this case, the carrier could belong to Cangzhou GD Jiaotong Yinyue Guanbo from China. In this example the carrier was so weak that I actually had no audio so identification

was impossible, however where you have some weak audio but you're struggling to find where to start on the ID, this can be incredibly powerful.

WavViewDX has many other features too. There is a variable bandwidth available to help you to narrow down the received audio, and this can be used asynchronously to help get rid of part of the upper or lower sideband where a strong station on a neighbouring frequency causes problems. There is some basic filtering and binaural audio treatments, and an audio recorder to capture anything of interest for future playback. There is also a comprehensive logbook which in itself is integrated to MWList, allowing for received stations of interest to be published to MWList for the benefit of others. Finally WavViewDX isn't just about MW. It can also operate in FM mode to offer similar features to FM DXers.

There are many more features within the software that are not covered here, but the summary is clear. For SDR users who can become overwhelmed with huge band recordings not knowing quite where to start, or for those who know they've got something interesting but just not quite what it is, WavViewDX can make a huge difference. Speaking personally, since starting to use the software I've made significantly better use of the small amount of time that I have free to DX, identifying stations from around the world that had I would have had much reduced chance of positively identifying just listening within my standard SDR software.

So what's next for WavViewDX? Reinhard says that its future direction lies at the hands of its users. "As a lot of the development is driven by requests of the user base, we'll see where the journey goes. But there are a few things on my to-do list. An analysis mode for NDB and support for more frequency lists - EiBi, HFCC, ILG are on the agenda, plus more features for FM DXers such as a connection to FMList along with a better RDS decoder." There also promises to be more features to support diversity reception and potentially some AI-based features for noise reduction or station identification.

One thing is clear. Tools such as WavViewDX can make a huge difference to the DXing hobby, elevating not only our own individual enjoyment of radio listening, but also allowing us all to contribute knowledge to the community for the benefit of everyone. Thanks to Reinhard for developing such excellent software for everyone's benefit.

WavViewDX is available for Windows, Mac and Linux, and is available free of charge from Reinhard's website - https://rweiss.de/dxer/tools.html.