



WSPRlite and DXplorer.net Fun and Games with Antennas and Propagation

Tim Kirby G4VXE takes a look at an interesting new product from SOTAbears, enabling you to evaluate your antenna system and much more.



Regular readers of *PW* may well have read Mike Richards' description of the WSPR (Weak Signal Propagation Reporter) mode designed by Joe Taylor K1JT.

Without revisiting Mike's detailed description of the mode, WSPR is designed to work in extremely low signal conditions. It is not a 'QSO' mode – you do not have a two-way contact with

someone on WSPR. You might consider it to be like a beacon transmission that others receive and the data on what they receive is automatically uploaded to the WSPRNET.ORG website. Within seconds of your two-minute WSPR transmit period ending, you can see where you have been heard.

Over the last few years, I've played with WSPR on both HF and VHF and found it interesting. Of course, if you use it with

your HF transceiver, you're tying up the transceiver and can't do much else with it.

It was with some interest, then, that recently I read of a new product from the well-known British company, SOTAbears, the WSPRlite.

What do SOTAbears have to say about the WSPRlite?

The WSPRlite (pronounced whisper-lite) is a low power transmitter that is designed to act as a standalone WSPR beacon on 30m (10MHz) or 20m (14MHz). Using a simple computer interface, you program the WSPRlite with your callsign and QTH locator. Once set up, the WSPRlite does not need the computer to operate. Just connect it to a USB power supply (such as a mobile phone charger), press the 'sync' button at the start of any even minute and off it goes! WSPRlite will make regular transmissions that are automatically received by stations around the world. These stations send their reports to a central website on which you can see where your signals are reaching within seconds. Even more fun is to leave your beacon running and monitor its performance using DXplorer on your smartphone or tablet. This is a great way to see how your station is doing when you are at work or even on holiday (do check on the regulations for unattended operation in your licence).

But There's More!

WSPRlite on its own sounds fun but it also comes with a subscription for a year to the DXplorer.net website. Here's what SOTAbears have to say about DXplorer.net:

We use the WSPR data to generate a special metric, DX10. We recalculate your DX10 range (km) every two minutes. DX10 is a great system performance indicator. The best HF system will give the longest DX10 ranges. Because you can compare the DX10 ranges for two stations in real time, you can see which one is the best and by how much. Along with real time DX10 graphs, we calculate a mean and maximum DX10 score for each station – very handy if you make changes to your antennas to see what the changes actually do.

How Does it Work in Practice?

The WSPRlite arrived packaged safely in a Jiffy bag with a simple slip of paper with a URL where the setup instructions could be found.

It's a small unit, 40 x 50 x 10mm, with a solid feel to it. It's got a button and a multi-coloured LED on the front 'panel', an SMA socket for the antenna connection and a USB connector for power and data.

I couldn't wait to try the WSPRlite out and happily it arrived on a day when I was at home. I found a suitable USB cable (the WSPRlite has a mini USB socket – you'll probably have plenty). Following the instructions provided on the web, I downloaded the setup program onto my Windows 10 PC and installed it. For some reason (no doubt specific to my installation of Windows), the port driver for the WSPRlite did not install automatically and I had to download it and install it manually. This was only a minor inconvenience and the instructions covered how to do it.

Now, running the WSPRlite setup program, with the WSPRlite connected by USB, the program was able to communicate with the device. I entered my callsign and my locator square and set the band to 14MHz. I left everything else as was.

The WSPRlite covers the 1.8MHz to 14MHz bands, excluding 5MHz. There are built-in filters for the 10 and 14MHz bands but if you use it on other bands, it is recommended that you use an external lowpass filter. SOTabeams provides a link to a G-QRP Club document on building these filters:

www.gqrp.com/harmonic_filters.pdf

SOTabeams have also now introduced their own lowpass filter kits to be used with the WSPRlite (and, indeed, for other purposes) on the 1.8, 3.5 and 7MHz bands. Details and pricing can be found on the SOTabeams website.

Rather than tie up a USB port on my computer, I grabbed a USB power supply from one of the Raspberry Pis on the desk and plugged it into the WSPRlite at which point the LED started flashing red. Then, I connected the antenna – in my case a rather old Butternut HF6V vertical at the end of 30m or so of very grotty coaxial cable.

To set the WSPRlite 'in motion' you need to push the button on the front exactly on the start of an even minute, so you'll need a fairly accurate clock to hand. I used an Atomic Clock application on my smartphone.

I pushed the button at the appropriate time and turned the monitor receiver to listen to the signal. Rather than the pure clear tone of a WSPR signal, it sounded frankly, flatulent. I realised that this was unlikely to be a problem with the WSPRlite but with the power supply. I grabbed an Apple USB charger and tried again. This time it sounded like a proper WSPR signal so I let the transmission continue.

After a couple of periods, I went to the WSPRlite website, below, and set the site up to list the last 50 spots of my signal. To my delight my little 200mW signal



Fig. 1: A comparison of G4VXE and G0FCH signal strengths over a 24 hour period, as reported by DX10 on the DXplorer website.

had already been heard around Europe. Domestic duties called and at that stage I had to go out for an afternoon of visiting family. The great thing was that using the WSPRnet website on my phone, I was able to check on progress and whether I was still being heard. Indeed I was and around sunrise at the western end of the path, I was pleased to be copied in the mid-west of the USA at a distance of around 4,500 miles. Conditions were not great, however, and the majority of the spots were around Europe, which was, of course, interesting and informative in itself.

<http://dev.wsprnet.org/drupal/wsprnet/spots>

Using DXplorer

After a day or two of looking at the spots appearing on the WSPRnet.org site, I decided to see what the SOTabeams DXplorer site had to offer. The WSPRlite setup program provides a unique URL for you to log in to the website. If you are wanting to access DXplorer on another device, perhaps your phone, you'll need to grab the URL and e-mail or message it to yourself.

Having logged in, there are options to see a table or graph organised by the SOTabeams 'DX10' metric, which is a measure of range. The graph was immediately of interest and you could see the range value changing throughout the day. It's a good idea to leave the WSPRlite running for a good period of time, perhaps a day or so, to allow the data to accumulate and a real picture to emerge.

If you find propagation fascinating, as I do, then it's really interesting to see what is happening at different times of the day, particularly those times when you may not be in the shack.

SOTabeams are justifiably proud of the comparison feature. This allows you to

compare your range graph with another station. To eliminate propagation variations, try to choose a station quite close to you. I spotted G0FCH also using 7MHz from Swindon, about 20 miles from me.

I've included a DX10 graph, **Fig. 1**, which shows the comparison of G0FCH's and my DX10 values over a period of 24 hours or so (you may select different time periods from an hour up to 30 days). It's immediately clear that G0FCH has a better antenna than me! But there are periods of interest when something curious happens. Look at how my antenna does a little better around sunrise, perhaps catching a bit of low angle radiation? Or is it because I am 20 miles farther east and pick up the propagation first? Fascinating stuff. So apart from having fun comparing your antennas against someone else's, you could make some other interesting comparisons, a dipole against a magloop, for example, or perhaps multiband Yagis against monobanders – it's only limited by your imagination.

You can also generate a great circle map that plots the various spots on the map, which is interesting. Hover over the dots on the map and you can see the data relating to that point, data such as the station spotting your signal and the signal level received. This could be very interesting for plotting the radiation pattern of a beam or a 4-square array, for example. It might even give you an idea of where the lobes on your dipole are on a particular band.

Be Warned!

The WSPRlite and DXplorer combination is extremely addictive! It's absolutely fascinating to see where your signals are reaching. Having a very visual means of displaying the propagation and antenna performance is amazing. Various antenna

experiments have come to mind to see how they may compare with my vertical (and indeed, it will be immediately obvious if the much needed maintenance on my vertical bears some fruit).

Naturally, when you are not doing a direct comparison against someone else's antenna at the same time, there will be differences (potentially quite substantial, in fact, day to day) depending on propagation. However, over time a pattern should emerge as to whether one antenna is better than another.

I asked **Baz Barrett G8DOR** to look out for my 7MHz signal with his remote receiver in Scotland. Baz was able to see it just fine but recommended that I move frequency slightly to get out of the centre of activity. That is not really possible with the WSPRlite because it randomly picks a frequency in the WSPR slot so you might get a different frequency if you reboot the unit but have little direct control on where your signal is coming out. It was also nice, by the way, to get a few spots of my signal from regular *PW* contributor **Carl Gorse 2E0HPI** in Hartlepool.

Conclusions

If you have an interest in HF propagation or antennas (or both), you will love the WSPRlite/DXplorer. There are any number of experiments that you might do. What about seeing where 200mW, or less, on 1.8MHz can be heard? Or, for the smaller garden, build a 14MHz ground plane antenna and see where you can be heard with that.

It's important to understand that DXplorer uses the data from WSPRnet.org and we are relying on other people's receivers to do our tests. WSPRlite offers no receiving capability. It feels right to suggest that once in a while, at least, you should run a receiver on the WSPR frequencies and put something back into the system. You could do that quite simply with an SDR receiver and an active antenna, for example, rather than tying up your main rig.

I asked **Richard G3CWI** whether, in future, it might be possible to add other bands to the unit and he said it would be, although there were no immediate plans to do so.

If you want to learn more about HF antennas and propagation, you will love a WSPRlite.

The WSPRlite is available from SOTAbeams priced £59.95. It includes a one year subscription to the DXplorer website, which is otherwise priced at £19.95. My thanks to **Richard G3CWI** at SOTAbeams for making the review model available. I enjoyed it so much that I've bought it! However, Richard has kindly offered a further WSPRlite as a competition prize, see right for details. 

Competition

Win a WSPRlite

Prize Value
£59.95

Richard G3CWI of SOTAbeams is kindly giving away a WSPRlite as a competition prize.

Just answer the three simple questions below to be entered into a draw. All can be answered from **Tim Kirby's** review. The closing date for entries is Friday March 10th and the winners will be announced in the May 2017 issue of *PW*.

Questions:

1. What does WSPR stand for?
2. What bands are covered by the WSPRlite?
3. Does WSPRlite need to be permanently connected to your PC to operate?

How to Enter

To enter our free competition, simply send in your answers either by e-mail or by post – all correct solutions will be entered into a draw to choose the winner.

E-mail your entry to wsprrite@practicalwireless.co.uk or post it (written on a postcard or the back of a sealed envelope) to **WSPRlite Competition, PW Publishing Ltd, Tayfield House, 38 Poole Road, Westbourne, Bournemouth, Dorset BH4 9DW** to reach us on or before the closing date of Friday March 10th 2017 - late entries will not be entered into the draw.

Please include your full name and postal address so we know where to send the prize. This information will not be used for any sort of marketing and will not be retained after the close of the competition.

The prize is a WSPRlite and no cash equivalent is offered. The winner will be notified by the editor and his decision is final; no correspondence will be entered into. The answers and the name of the winner will appear in the May issue. Good luck!

