

# A Personal Portable Repeater for D-STAR

## An avenue of exploration

It has been, and continues to be, a personally gratifying journey for me, getting involved with D-STAR.

The protocol allows for much in the way of experimentation and it links into computer technology in a way I find both interesting and fairly easily comprehensible (once a few challenges have been overcome!)

The success of the talk I gave at the club last October, with around 40 members attending, was very pleasing, but to see almost 20 members give up their Saturday for a hands-on practical workshop was indicative of the fact that D-STAR, while it may have the occasional detractor or two(!), has its own attraction and makes for a unique Amateur mode, with which many Wythallians are having lots of fun. Some have even had D-STAR radios for Christmas! J

## The DVAP Dongle

Recently I had been thinking around the possibilities of making more use of the DVAP Dongle.



This little device (also known as the "Red" Dongle, though some people use other versions known as a DVMega) is a great boon to the D-STAR enthusiast.

It allows low power access to the Internet using any available D-STAR radio. The DVAP in effect, acts as a very low power (10mW) personal simplex repeater (known also as a Gateway)

Since these are available in either 2m or 70cms flavours (and I have a 2m one at home already as my personal access point) I thought I would take advantage of the superb offers at the Martin Lynch open day that 10 of us attended at the

end of November, to grab a 70cms version purely for "experimental purposes"!

## But what to do?

As is often the case however, I had bought it partly on a whim, knowing there were lots of things I *could* do with it but with no particular preconceived idea about what I really *wanted* to do with it.

However, one thing that has intrigued me over the past few months, was the possibility of setting up a completely self-contained Simplex D-STAR Repeater that could be used portable.

## Inspiration from Dayton

Back in May, I had been listening to the Dayton Ohio D-STAR Reflector while the Dayton Hamfest was taking place. I noticed that some US Hams were saying how they had driven the hundreds of miles to Dayton and had never lost D-STAR coverage, even though there were no D-STAR repeaters along the route!

## How was this possible?

It turned out that they were using DVAPs in their cars and using their mobile phones' data capability as the Internet part of the system.

I have been on a long learning curve personally with D-STAR, so this was something I immediately put on my mental "to do" list for some day in the future, but with the knowledge that I have gained over this year, I realised that this was now not *that* difficult to implement, at least in theory.

What was more, I already had most of the bits to try it out!

## Sourcing the ingredients

While a DVAP will plug in to any computer with a USB socket, most hams like to use the Raspberry Pi Computer.

This is because it is small, compact and efficient, a perfect match for the DVAP and it can be totally dedicated to just the one task - just what the doctor ordered for this project!

I use a free image OS customised for D-STAR provided by Brian GW6WTK from <http://www.westerndstar.co.uk> and then adapt the settings to suit. I needed

a new version though, as for this project, I would be using the new improved Raspberry Pi model B+.

The Raspberry Pi doesn't have wireless capability as purchased, so I popped over to Amazon and picked up an "Edimax" Nano Wi-Fi USB dongle for about £7 which was already known to be supported on the Pi "out of the box".

For tidiness, I also sent off for some extra short USB connecting leads, one to connect the Pi to the DVAP and the other to power the Pi, again just a few pounds.

Finally, I picked up a top quality Anker 13Ah 5v USB battery on special offer from Amazon for £19.99 reduced from around £70 - don't we all love a special offer?

## Getting it all together

Once all the parts arrived, it was just a case of connecting everything together, entering the correct software settings and enabling the Mobile Phone tethering. I did hit one snag where it seems you need to have the Phone in Wi-Fi Hotspot mode *before* booting up the Pi, but with that solved, everything was up



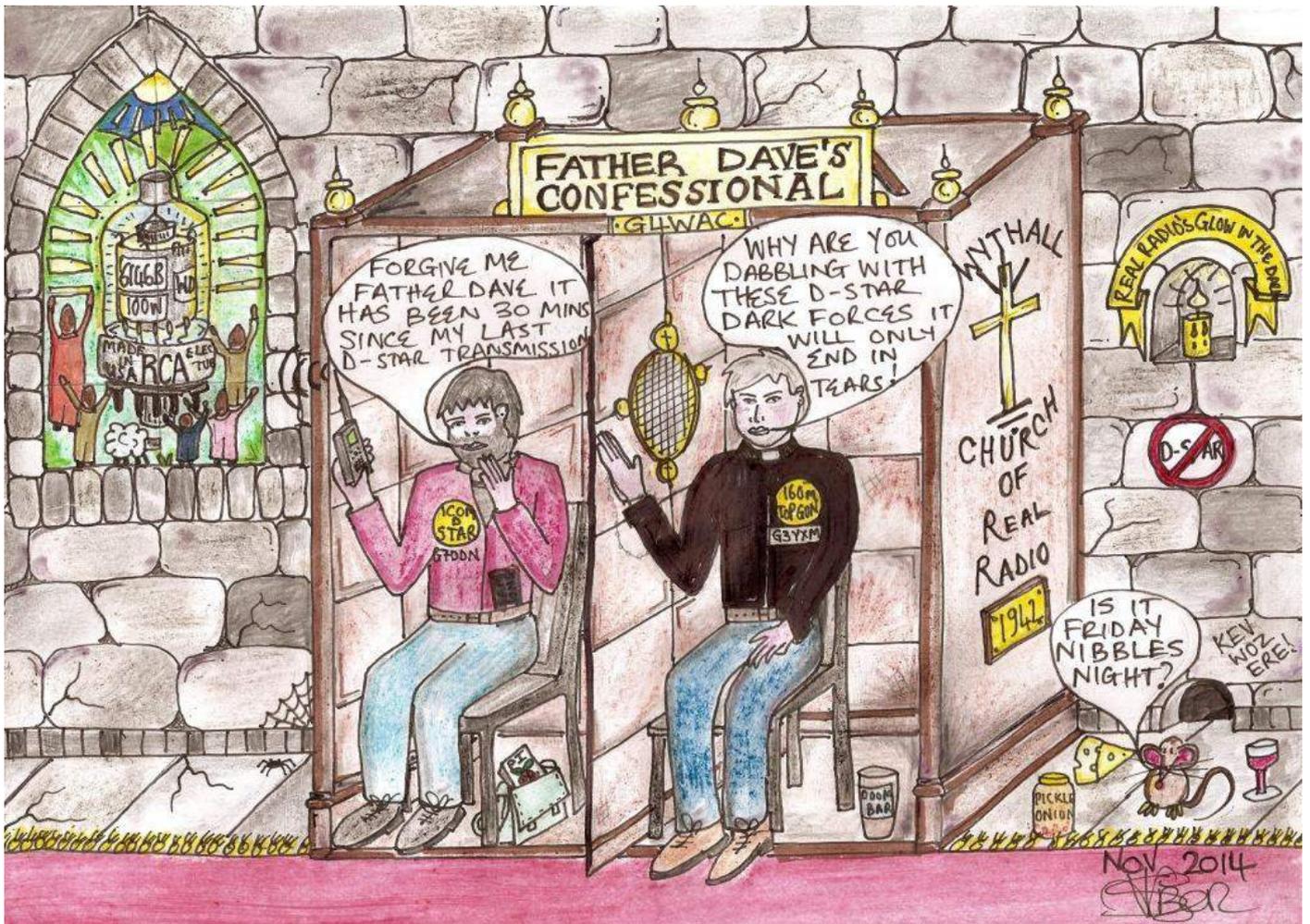
and running great.

## Testing, testing...

The first test was while driving from Solihull to home. I called through the Midlands DCS005M reflector and worked G0TPZ with hardly any dropout at all.

Speech quality was pretty much as standard, but you might expect that as D-STAR is a narrow, low bandwidth mode anyway. A little dropout occurs once in a

( continued on page 3>>>>)



## A Personal Portable Repeater for D-STAR... Cont'd

while but it really is not that bad - it is probably related more to the level of signal received in the car from the cell-phone tower or maybe even the swapping from cell to cell.

Other amateurs have tested the demands on your data plan - I understand it to be around 40MB over about 5/6 hours of almost constant use. That's plenty to play with, even if you have a relatively stingy data allowance on your mobile phone plan.

### So... a G7DDN Portable Repeater is born!

All in all, the homemade D-STAR Mobile Repeater is a fantastic addition to the armoury. I can now be mobile *anywhere in the world where there is mobile phone coverage* and work the world (or indeed, just back to Wythall!)

There is also something ironic and just a little quirky about using the commercial cellphone data network to "piggy back" my QRP Ham signals!

### Wherever next?

Something like this would have been unthinkable a few years ago and is, for me, just another example of the flexibility and adaptability of D-STAR.

In my October talk, I referred to D-STAR being a good example of an "emerging technology" and this project is a good instance of how the protocol adapts to developments.

Indeed, perhaps the greatest advantage of digital radio is exactly this; that there is so much that you can play with, when signals are in the same binary

language spoken by computers themselves!

Chris G7DDN

