

## How to identify VDSL interference at HF

### Why does VDSL cause interference on the HF bands?

VDSL (Very-high-bit-rate Digital Subscriber Line) is the pre-eminent means used to deliver broadband internet services to residential customers in the UK. VDSL uses the existing unscreened, twisted-pair “telephone” cables to carry high speed broadband data signals between the network provider’s street “cabinet” and the customers premises. This is typically a distance of up to a few hundred metres, and may use underground or overground cables, or a combination of the two.

VDSL uses the spectrum from 25kHz to 17.664MHz and because it uses twisted pair cables designed originally to just carry audio telephone signals up to 3.4kHz, the VDSL signals leak out of these cables creating the potential for interference on all HF amateur bands from 160m up to 20m.

VDSL uses sophisticated digital coding, and therefore, on an HF receiver, the interfering VDSL signal just looks like wideband noise. The effect of this interference is to raise the apparent HF background noise floor, often by 10 – 20dB, but by even more in the worst cases, thereby masking the reception of all but the strongest amateur signals. Because the interference looks like wideband noise with no specific identifying characteristics, it is difficult to know whether it is true VDSL interference or just a raised level of background noise that could have a myriad of different causes.

### So how can you identify whether you are suffering from VDSL interference?

The VDSL spectrum (from 25kHz to 17.664MHz) is divided into 6 discrete frequency bands; 3 of which are used to carry upstream data (i.e. from the subscriber towards the broadband network) and 3 of which carry downstream data (i.e. from the broadband network towards the subscriber). These 6 bands are frequency interleaved and are separated by small (approximately 50kHz) guard-bands. No VDSL signals are transmitted within these guard bands and therefore if the background noise level in these guard bands is much lower than the background noise 100kHz or so above and below the guard band, then not only does this positively identify the interference as being from VDSL, but it also gives a strong indication of how much the noise floor is being raised by the presence of the interference.

The VDSL frequency bands used in the UK are as shown in the following diagram.



Thus the guard bands occur at 0.025MHz, 0.138MHz, 3.75MHz, 5.2MHz, 8.5MHz and 12MHz.

The best ones to investigate are at 5.2MHz, 8.5MHz and 12MHz. Tuning around on an HF receiver, if the background noise decreases on one side of the guard-band frequency and then rises again on the other side, then this would indicate the presence of VDSL interference. When viewed on an SDR receiver, the guard-bands can be clearly seen on a spectrum display. The following diagram shows an example of the 8.5MHz guard-band in the presence of strong VDSL interference.



However, when looking for VDSL guard-bands, be aware that any particular VDSL system may not necessarily use all the upstream and downstream bands so it may be necessary to check more than one of the guard-bands.

### What can you do to reduce or even eliminate VDSL interference?

Unfortunately, VDSL interference to HF band reception is often very pervasive. Nevertheless, there are a number of things that may help e.g. moving the antenna as far as possible away from the telephone cables, using a directional antenna if possible, or using a different receive antenna such as a loop antenna. If the interference is coming from your own VDSL service, then try moving the VDSL modem as near as possible to the incoming telephone master socket, removing any internal telephone extension cables that you are not using or rerouting the telephone cables as far as possible away from the shack and the antenna.

Further details about the effects of VDSL interference, and the measures that you can take to reduce it, can be found in EMC Advice Leaflet EMC 15 available from the publications page of the RSGB website. <https://rsgb.org/main/technical/emc/emc-publications-and-leaflets/>

### Report the interference to Ofcom

If you are suffering from VDSL interference and this is adversely affecting your use of the HF bands, then we strongly urge you to report it to Ofcom. It is only if sufficient numbers of users complain that Ofcom may take the problem seriously. However, regrettably, recent experience with Ofcom has been mixed, with them only taking action in a very limited number of cases and being much less responsive in many other cases.

Also, before reporting interference to Ofcom, and to minimise the risk of incurring Ofcom's costs of undertaking an investigation, you should:

- keep a log of all incidents including the time date and frequencies affected (measured for at least two weeks);
- establish that the source of harmful interference is not within your control;
- ensure that your station is functioning correctly; and
- ensure that all reasonable steps to minimise the interference have been taken.

But it is important that Ofcom are made aware of interference even if they are unwilling or unable to resolve the problem. Follow the link below to report interference

<https://www.ofcom.org.uk/spectrum/interference-enforcement/interference-to-amateur-radio>